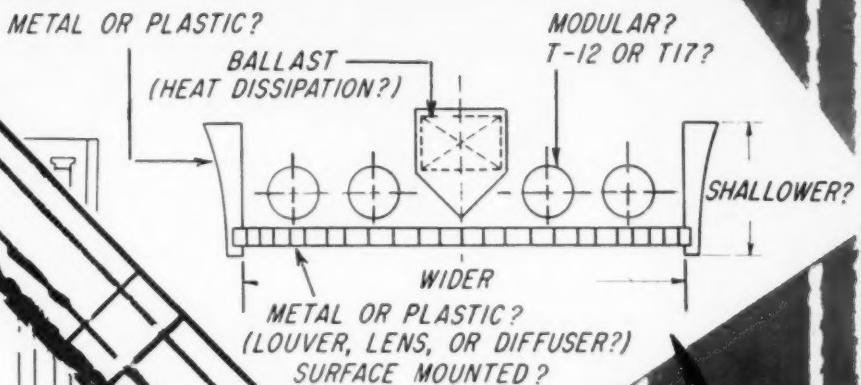


Electrical Construction and Maintenance

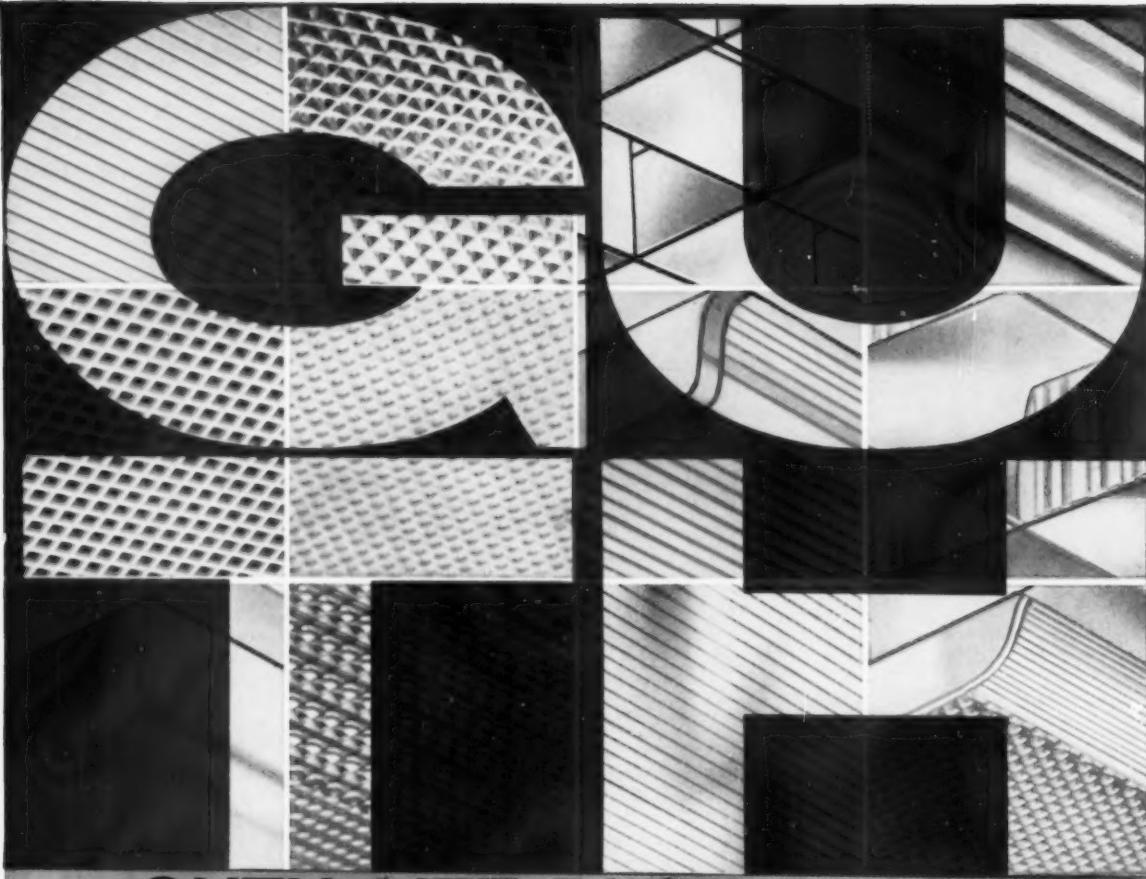
WITH ELECTRICAL CONTRACTING

ANDS IN
LIGHTING
EQUIPMENT
DESIGN



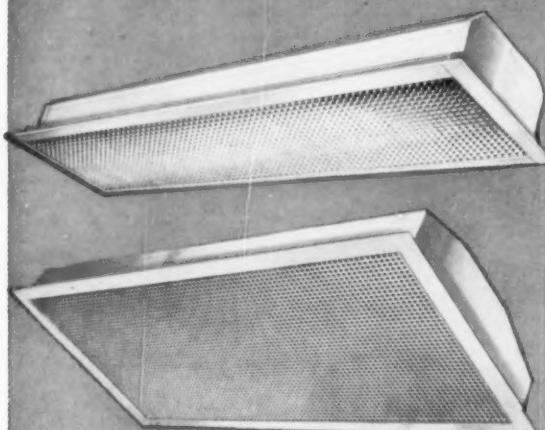
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| 58TH YEAR



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**the quality line
with unlimited variations**



Guth Lite-Blox troffers are carefully engineered, precision made and cover practically every type of troffer job you can name . . . for almost every ceiling suspension system:

Long or Short—Slim or Wide! 1' x 2', 1' x 4', 1' x 6', 1' x 8', 2' x 2', 2' x 4'.

Broad Lamp Selection! 1, 2, 3 or 4 lights in 1' models, 2, 3 or 4 in 2' troffers.

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Labor Saving Installation! Complete units, ready to mount. One man can hang them. Modular lengths to fit most every ceiling system.

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WRITE FOR COMPLETE INFORMATION TODAY!

**THE EDWIN F. GUTH CO.
ST. LOUIS 3, MISSOURI**

Trusted Name in Lighting Since 1902

*U. S. and Can. Pat. Pend.

†U. S. Pat. 2,745,001; Can. Patd. 1957, 129,243

it's FSP...100 to 3



BOX AHEAD

Only 3 boxes in your stock are all you need to rough-in any 100 ampere service. No excess inventory in the shop or on the truck.

Designed-in Quality

Aluminum and copper cable approval...Box lugs throughout...All circuits out either top or bottom...Fits flush in shallow walls—Many more time-saving features assure low-cost installations.

SQUARE D's NEW FSP FUSIBLE LOAD CENTER LINE IS A SURE CURE FOR YOUR FUSIBLE HEADACHES

*Write for FSP Bulletin SD-111 for the complete story
Square D Company, 6060 Rivard Street, Detroit 11, Mich.*

SQUARE D COMPANY

Another FIRST

by

APPLETON

"STN" Sealtite Connectors

for liquid-tight
flexible conduit

PATENT PENDING



Now . . . the fastest, most economical, most trouble-free method of making liquid-tight connections is yours with new APPLETON "STN" Connectors . . . featuring the exclusive wedge adapter!

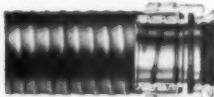
This wedge adapter tightens almost flush with inner box wall, requires no wrench inside box, and forms a constant pressure, "cold-weld" seal with the box metal! A locking edge on the body of the connector bites into the outer metal of the box so that after the connector is tightened, a positive ground is maintained. The only pressure required to tighten is exerted on the portion of the connector outside the box.

This lasting liquid-tight seal is assured without the use of an "O" ring and ring gasket. There is nothing to deteriorate, only a "cold-weld" metal-to-metal seal which resists vibration and lasts indefinitely!

No matter what features you want in a liquid-tight connector . . . single wrench installation ease, more wiring room, positive ground, vibration protection . . . this NEW APPLETON "STN" Connector stands alone in the field! Write or call for complete information today.

New Insulated Throat! Eliminates the possibility of metal edges damaging wiring . . . perfect for constant vibration installations. Does not reduce inside diameter of throat.

Patented brass ferrule serves as a positive ground . . . excludes liquids and fumes from connection.



Cross section of "STN" Connector which is installed as a unit shows how tapered end of nut compresses ferrule wall . . . seals perfectly and gives positive ground between conduit and connector.

All APPLETON "STN" Series Connectors with the patented brass ferrule and insulator have nothing to come loose, deteriorate, crack, or break! . . . they stay tight! And, since the threaded brass ferrule screws in and crimps on, you have a perfect seal and permanent ground . . . maintaining voltage in ground circuit year after year within 10 millivolts drop. Specify them on your next order. They positively exclude liquids, fumes, chips, shavings and other foreign matter from the connection!

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Electrical Construction and Maintenance

with which is consolidated Electrical Contracting, The
Electragist and Electrical Record . . . Established 1901

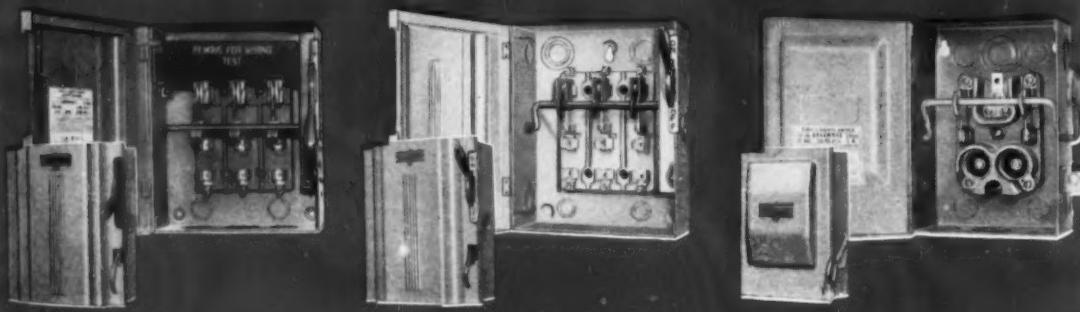
Published for electrical contractors, electrical departments in industry, engineers, consultants, inspectors and motor shops. Covering engineering, installation, repair, maintenance and management, in the field of electrical construction and maintenance.

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MORE

WHATEVER YOU DO... WHOEVER YOU SERVE... it pays to use Cutler-Hammer Safety Switches



HEAVY INDUSTRIAL SERVICE

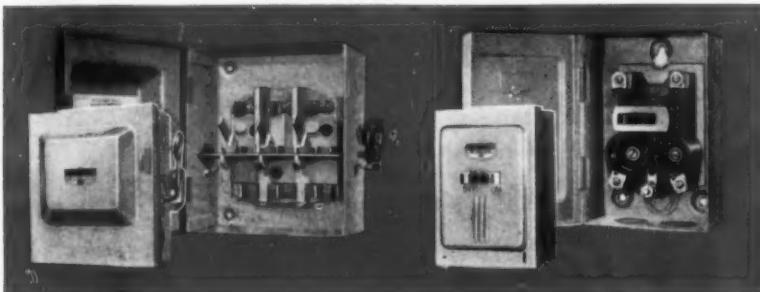
The Cutler-Hammer 4105 Heavy Duty Type A Safety Switch is specifically designed and constructed to insure safe, dependable performance under the most severe operating conditions. Features: "heat-proof" design • high quality, heat resistant materials • duo-strength operating hooks • spring type fuse receivers • quick-change operating unit • available in all needed sizes, types, and enclosures.

STANDARD INDUSTRIAL SERVICE

The Cutler-Hammer 4131 Normal Duty Type C Safety Switch provides economical circuit disconnect service for all standard industrial and commercial applications. Features: quick make and break mechanism • single break, double-faced contacts with reinforced jaws • wiping-action arc snuffers • solderless lugs • available in a wide range of sizes, types, and enclosures.

LIGHT DUTY DISCONNECT SERVICE

The Cutler-Hammer 4141 Light Duty Type D Safety Switch serves as an ideal low cost circuit disconnect for all light duty, general purpose applications. Features: plug type fuse holders • positive make and break mechanism • Easy-tite screw terminals • shock-proof fuse holders • formed contact clip construction • 30 ampere capacity, 125/250 volts • NEMA 1 and 3 enclosures.



LIGHT DUTY GENERAL SERVICE

Designed for low cost circuit disconnect and service entrance applications, the Cutler-Hammer 4143 Light Duty Type D Safety Switch is widely used with heavy lighting, heating and range circuits. Features: cartridge type fuse receivers • positive make and quick break mechanism • formed contact clip construction • available in a wide range of sizes, types, and enclosures.

LIGHT DUTY A-c SERVICE

The Cutler-Hammer 4151 Light Duty Type D Safety Switch is the perfect low cost, domestic motor disconnect. The 4151 is unusually compact and yet, easily installed and wired. Features: toggle operated • double break, butt type silver contacts • shock-proof, plug type fuse holders • 30 ampere capacity, 120/240 volts A-c • NEMA 1 enclosure.



For prompt attention to your safety switch requirements, see your nearby Authorized Cutler-Hammer Distributor. Also write today for Pub. EA-100-U-241, the Cutler-Hammer Merchandiser...the handy motor control purchasing guide. CUTLER-HAMMER Inc., Milwaukee 1, Wis.

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October 1958

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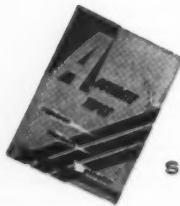
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GARFIELD, NEW JERSEY

Washington Report

OCTOBER • 1958

Business recovery continues, paced by rising production and personal incomes, mild upturns in employment, retail sales, electric power output, and capital spending for new plant and equipment. New construction also continues its incremental growth pace, and unemployment is decreasing slowly. Overall, 1957's national economy record is now being matched, demonstrating the nation's remarkable recuperative power from the recession which began only a little more than a year ago.

The economic and business recovery now being witnessed confirms the rightness of the Eisenhower Administration's decision to stand firm against tax cuts and huge public spending programs, which were urged by many Congressmen and others early this year. Increased government spending was a factor in the upturn. But authorized spending increases got under way slowly, and are only now beginning to benefit.

Significant authorized government spending increases to combat the recession include: \$700 million for defense; \$600 million for additional unemployment compensation insurance payments; \$400 million for federal employee raises; \$200 million for public works; and about \$1 billion for housing loans through federal agencies. These increases in government spending, coupled with a decrease in expected tax revenues of about \$6 billion as a result of the recession, plus other increases in spending not associated with combating the recession, will add up to an estimated \$12 billion deficit for the current fiscal year.

Construction spending set another monthly record in August, when it reached a total of \$4.8 billion. This is an increase of \$200 million over July, and of \$100 million over August of last year. Privately-financed work rose \$87 million from July, to a \$3.2 billion total, while publicly-financed work was up \$75 million from July, to a \$1.6 billion total, and up \$117 million over August of last year.

Housing starts in August totaled 119,000, for an annual rate of 1,170,000. This is the best since 1956, and a 7% margin over August 1957. New home mortgage applications also increased. But realtors advise that new residential construction is running ahead of sales this year, resulting in market depreciation for existing homes.

Industrial building in August was down 41% from a year earlier, twelfth straight month to show a decline. The latest SEC—Commerce survey indicates a mild upturn for this quarter in capital spending for plant and equipment, but the increase is largely for modernization, and cost-cutting equipment, it is reported, rather than new capacity.

Highway spending will reach \$6.2 billion this year, Commerce Dept. estimates, or about 10% more than last year. Preliminary estimate for 1959 is \$7.1 billion, rising to about \$7.7 billion by 1961.

Current status of some national economy indicators: FRB production index for August was 137, representing a gain of more than half the dip made during the recession; personal income rose to \$355.6 billion annual rate in August, highest on record; employment rose to 65.4 million in August, while unemployment dropped to 4.7 million; electric power output in week ended September 6 was 12.025 billion kwhr, 3% above year-earlier similar week; steel output in September was about 65% of capacity, a high for 1958; cost-of-living in August was 123.7% (of 1947-49 average), down 0.2% from July for its first monthly decline in two years; retail sales last quarter were about equal to 3rd quarter of last year, but are expected to increase mildly this quarter.

Social security taxes will increase beginning January 1, 1959 for both employers and employees, each paying \$120 annually for workers whose annual salaries are \$4800 or above. New rates, approved by Congress, include additional boosts every three years until 1969, when annual payments will total \$216 each for worker and employer.

Sidelights

MODERN LIGHTING SYSTEMS

Opening our feature section this month is a special report by Berlon C. Cooper summarizing the current trends in lighting equipment design and how modern equipment and components can be employed in practical lighting system layout and application. Behind this project is an extensive survey conducted by the author, which developed the very latest practical illumination concepts from a number of the industry's leading specialists in design, engineering and application technology.

NEW ILLUMINATION RECOMMENDATIONS

An extra feature of particularly timely importance in this issue tabulates the recently released I.E.S. footcandle recommendations. Following the formal report of the Blackwell research, the various technical committees of I.E.S. reviewed past minimum standards and developed new recommendations reflecting practical interpretations of the research findings. The new recommended values are presented in a special four-page insert following page 108. They should be studied carefully as a great many of the recommendations are at least twice the previous values. Speedy industry adoption of the new standards is virtually certain. Based as they are upon a monumental eight-year research project, the new recommended footcandle values have impressive scientific support, and should be a strong influence in the design and application of more useful and satisfactory lighting installations.

MODERNIZATION

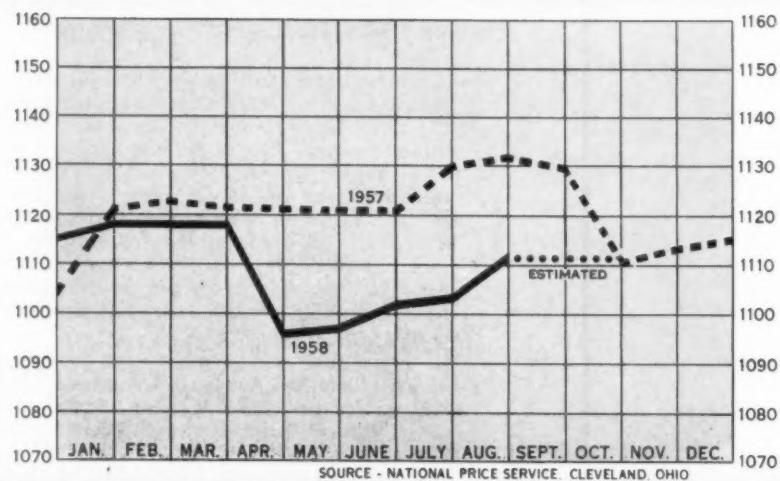
The recent patterns of capital expenditures show a distinct swing toward larger investments devoted to the modernization of existing plants and equipment. In planning for 1959, the tremendous market opportunities for new electrical systems and equipment in existing buildings deserves particular emphasis. In cooperation with other McGraw-Hill publications, Electrical Construction and Maintenance will present a special report next month interpreting our industry's stake in modernization, including a series of selected case studies of recent modernization projects.

SAFETY IN POLE LINE WORK

Routine pole line electrical construction is actually specialized work with a high degree of hazard for the lineman. Because of the height at which they work and the usually high voltage of the circuits they handle, pole line personnel must adhere strictly to tried-and-tested regulations for safety. A safety program for their work must be thorough and regularly practiced to develop necessary "habits of safe performance". Starting on page 97, Alfred L. Dowden of Liberty Mutual Insurance Company sets forth a basic safety program for line construction based on experience with this type of work. The story covers both in-shop and on-the-job phases of planned safety.

ELECTRICAL MATERIALS COST INDEX

BASE LINE (1000) REPRESENTS COSTS OF TYPICAL ASSORTMENT OF MATERIALS FOR A SELECTED JOB AS OF NOVEMBER 1, 1951. INDEX POINTS REPRESENT THE VARIATION OF THESE SAME MATERIAL COSTS AS OF THE FIRST OF EACH MONTH.

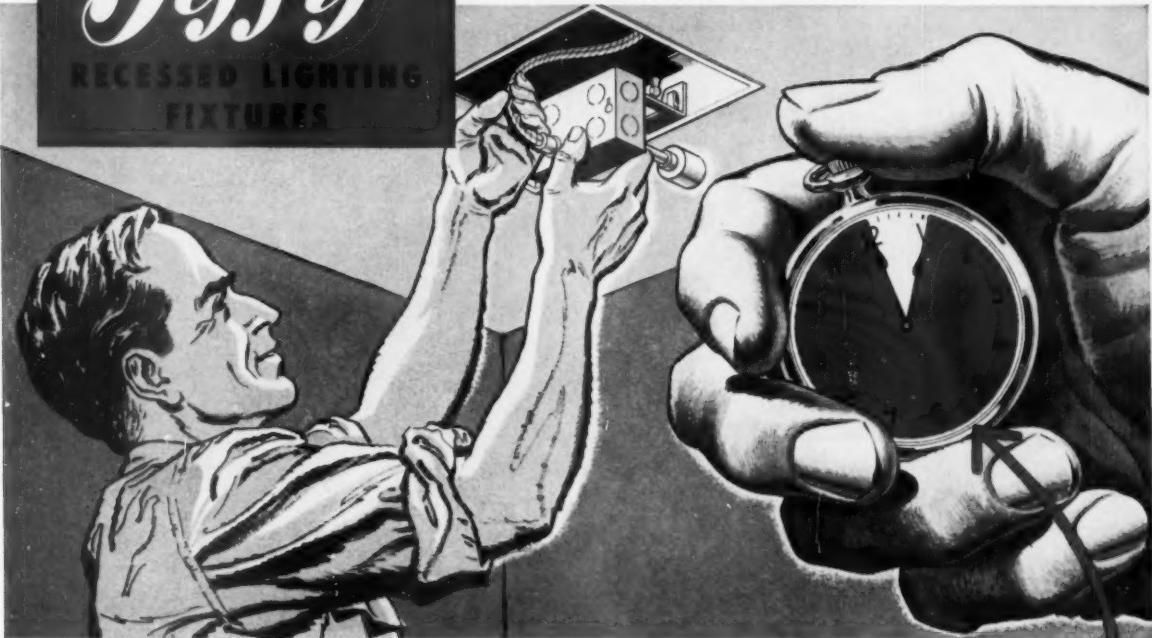


progress

"Jiffy"

RECESSED LIGHTING
FIXTURES

revolutionary!
cuts installation time by 2/3
no tools needed!



**average recessed fixture
installation time: 15 MINUTES!**

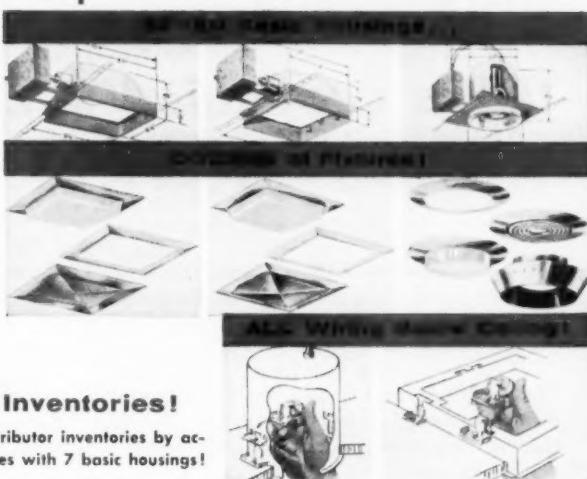
PROGRESS clocked electricians at work . . . found revolutionary new "JIFFY" fixtures take $\frac{1}{3}$ the time to install—because all wiring is below ceiling, no tools are required! "JIFFY" is an amazing advance in recessed fixture design with these quality features:

- "FLIP-TOP" HINGED JUNCTION BOX . . . wired below ceiling
- "THUMB-LOK" CLAMPS . . . eliminate carpentry
- LEVELIZER SOCKET for instant alignment
- CONCEALED TRAXION HINGING
- OPTICALLY DESIGNED PARABOLIC REFLECTORS
- SWING-OUT REFLECTORS
- ALL TYPES OF FINISHES



Cuts Down Inventories!

"JIFFY" cuts down distributor inventories by accommodating all fixtures with 7 basic housings!

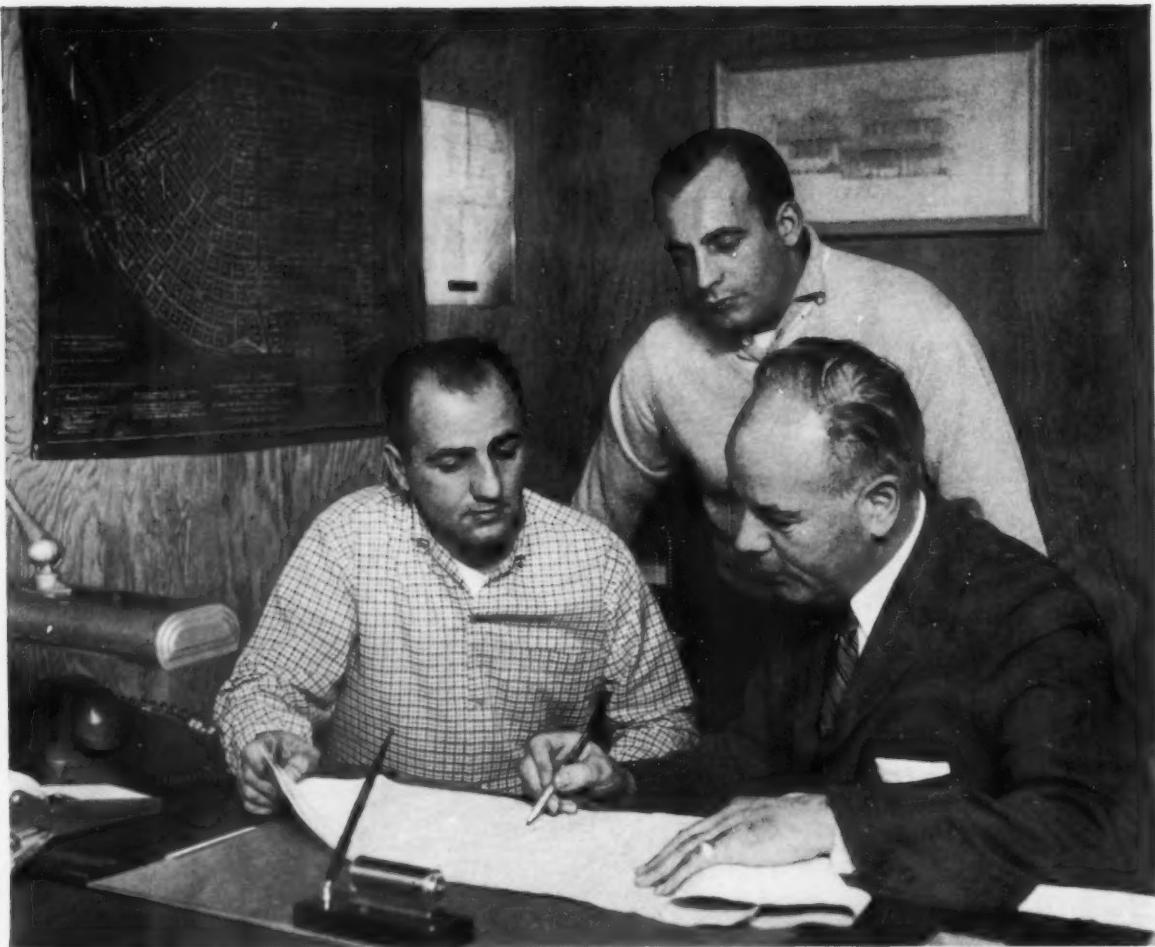


Get the amazing facts on
"JIFFY" today! Write:

PROGRESS Manufacturing Company, Inc.

Philadelphia 34, Pa.

Covered by Patent Numbers 2,840,691; 2,561,986; 2,684,220—Other Patents Pending.



PLANNING INSTALLATIONS Nick Stivaletta (left) and his brother Mike (standing) plan locations for telephone outlets in a new home with Don Cotter of the telephone company.

"A popular feature that pays off— that's concealed telephone wiring"

—say *Mike and Nick Stivaletta, Builders, of Randolph, Mass.*

"Concealed telephone wiring is a 'must,'" say Mike and Nick Stivaletta. "People know about it and demand it. In our new Deer Park Development, for example, all 250 homes will have it.

"For such a small outlay, it sure pays off. Easy to put in, neat, attractive, it tells our prospects that we're giving them value. We mention in our newspaper advertising that our

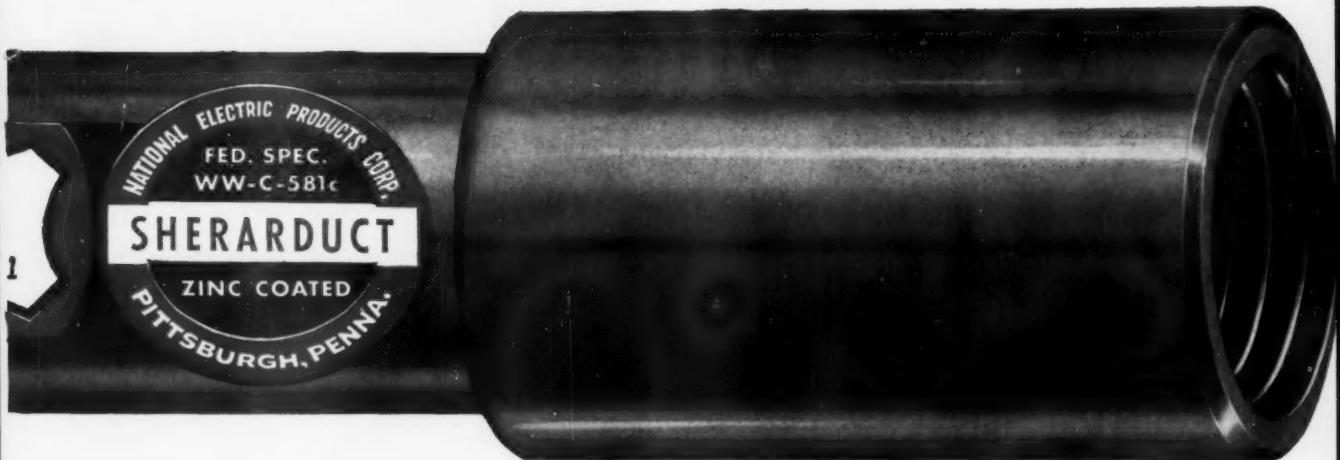
homes are telephone planned. In today's competitive market we wouldn't offer a home that wasn't."

Your local Bell Telephone business office will be glad to help you with concealed wiring plans. For details on home telephone wiring, see Sweet's Light Construction File, 8i/Be. For commercial installations, Sweet's Architectural File, 32a/Be.

BELL TELEPHONE SYSTEM



HERE'S *double* PROTECTION



NOW galvanized Sherarduct is coated with NEW FORMULA MVC-1

the modified vinyl copolymer that provides the most effective barrier against corrosive agents of all kinds

National Electric has developed a new way to combat conduit corrosion. It is called Formula MVC-1, a new modified polyvinyl chloride resin coating that's available only from National Electric.

Here's what MVC-1 does to even further increase the protection against corrosion offered by the Sherardizing process of galvanizing.

RESISTANCE TO CORROSIVE ATTACKS—In accelerated salt spray, sulphuric acid and caustic tests conducted by the Pittsburgh Testing Laboratories, new Sherarduct with Formula MVC-1 far outlasted all hot dipped and other high-grade coated and galvanized conduits tested.

RESISTANCE TO FLAKING—Formula MVC-1 makes a tight, uniform, adhesive coating that withstands bending without cracking or flaking.

TEMPERATURE RESISTANCE—Formula MVC-1 is extremely resistant to high and low ambient temperatures and will withstand the majority of all industrial temperature conditions.

NOW ADD THIS NEW CORROSION RESISTANCE TO SHERARDUCT'S OTHER FEATURES

1. The Sherardizing process of galvanizing that alloys zinc with the conduit walls.
2. Normalized, highly ductile steel for easy bending and threading.
3. Zinc protected threads for complete end-to-end protection.

These are the features that convince architects, engineers and contractors it is best to specify National Electric Sherarduct when real corrosion protection is required. Write for complete information on new Sherarduct today.

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Sherarduct is Galvanized Conduit at Its Best

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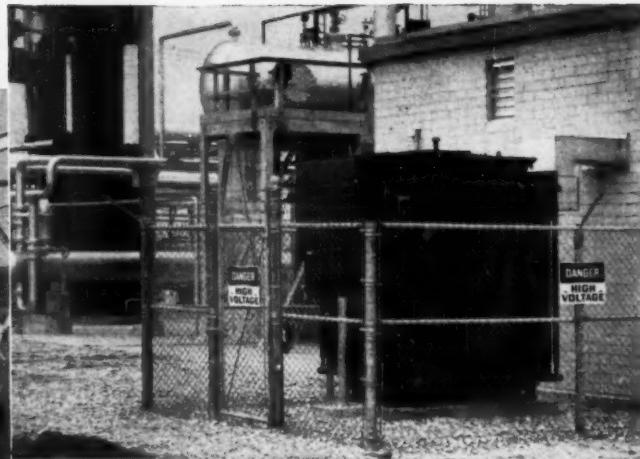
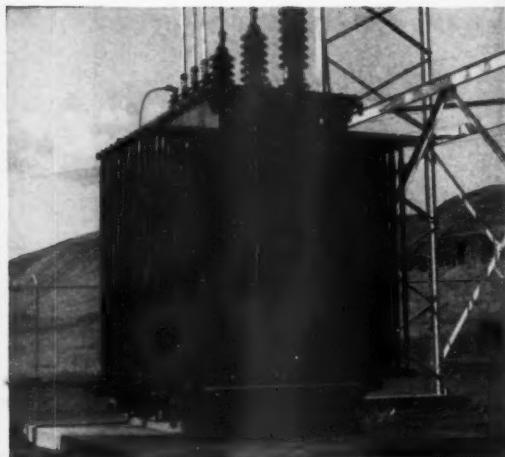
This 2500-kva Uptegraff power transformer, being installed at the Taunton Municipal Lighting plant in Massachusetts, is one of several units used in conjunction with a new 16,500-kw turbine unit.



One of several Uptegraff transformers furnishing power for the Benzene Toluene plant addition to the Richfield refinery at Wilmington, California. Long, trouble-free performance is vitally important in round-the-clock refinery operations.



MASSACHUSETTS to CALIFORNIA



Here is a 1500-kva Uptegraff power transformer located in Cleveland, Washington. It is one of several Uptegraff transformers serving the Klickitat County public utility at Goldendale.

This 1000-kva liquid-filled load center transformer is one of several Uptegraff transformers helping supply the power requirements for a new Celanese Plastics Division plant in Houston, Texas.

Uptegraff transformers serve industry's power needs!

The *extra* quality of today's Uptegraff transformers is due to a forward-looking program in research and development. This involves new and better raw materials, fabricating systems and assembly methods. It has resulted in important transformer advances . . . lasting oil preservation . . . completely leak-proof tanks and fittings . . . use of grain-oriented steel core for lighter weights, smaller sizes, lower core loss and exciting current . . . flow-painted exteriors assure three-mill paint coat and complete coverage . . . etc.

New designs provide capacity beyond normal rating

These improvements *plus* strict quality control in

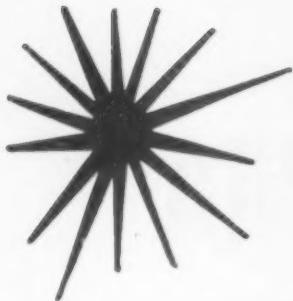
manufacturing and advanced testing methods assure the *extra* transformer capacity *beyond nameplate rating* to successfully withstand momentary overvoltages, high temperatures and other abusive conditions.

Meet the people of the Uptegraff Company

This picture-story booklet will give you an intimate view of the Uptegraff Company, and the people who design and build Uptegraff transformers. Send for your copy **TODAY**.

**R. E. UPTEGRAFF MANUFACTURING CO.
SCOTTDALE, PENNSYLVANIA**





EVERY FEATURE YOU WANT!

in the NEW P&S 3-WIRE DUPLEX GROUNDING OUTLET with pressure terminals

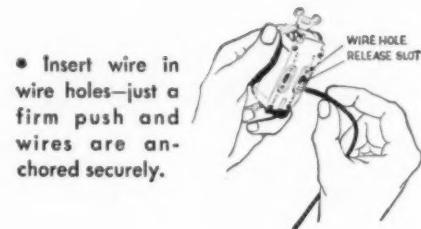
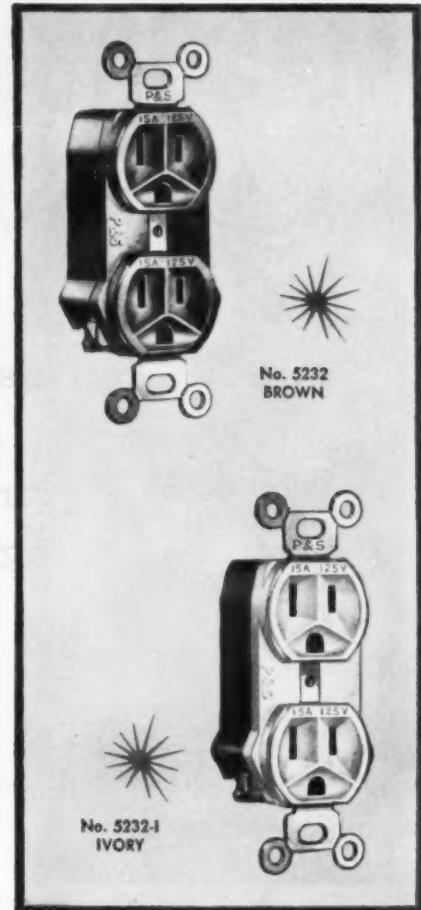
The new P&S No. 5222 3-wire grounding outlet with pressure terminals combines *all* the features you'd ever want in a three-wire grounding outlet.

Designed for industrial, commercial and home use, this *new* grounding outlet is easy to install, saves wiring time and has the long-lasting quality you expect in P&S devices.

- For use with No. 12 and No. 14 solid wire.
- Pressure terminals clearly identified for black and white wires — simply strip wires and insert in proper holes.
- High quality bronze springs hold wires securely and prevent loosening from vibration.
- Built-in wire slots firmly position inserted wires.
- Bronze contacts with rounded surfaces assure trouble-free insertion and withdrawal of cap blades.
- Recessed strip gage for quick, accurate stripped wire length.
- Meets Federal specifications WR - 00151b.

Available in brown with one green binding screw (No. 5222) or with two screws (No. 5232), or in ivory with one screw (5222-I) or two screws (5232-I).

Why not try 5222 and 5232 and convince yourself? For free catalog sheet write Dept. ECM1058.



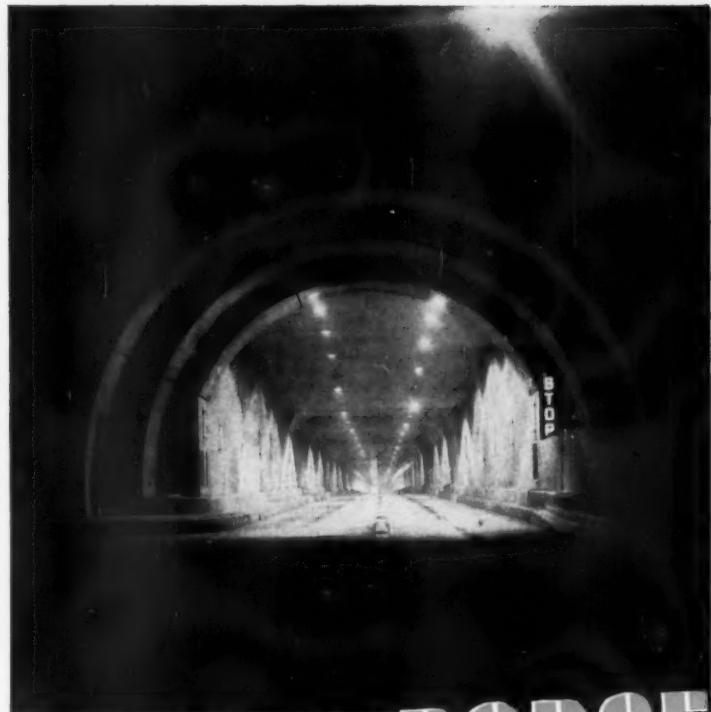
- Insert wire in wire holes—just a firm push and wires are anchored securely.
- Wide release slot permits loop wiring.



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Turnpike ...
Model for
Modern Motoring



WIRE BY PHELPS DODGE

When the Pennsylvania Turnpike opened in 1940, it was the first modern highway of its kind in the East. Since then, it has earned a reputation as a model super-highway whose design combines a free flow of traffic with a low accident rate.

One of the requirements for the Turnpike tunnels, interchanges, approaches and portal buildings was an electrical system of the highest quality. That's why Phelps Dodge building wire and rubber insulated, neoprene-jacketed cable was installed. For 18 years, this wire and cable has been giving the Turnpike dependable, trouble-free service.

On every wiring job where top-quality performance, expert workmanship and experienced "know-how" are called for, *it pays to rely on Phelps Dodge and your Phelps Dodge distributor!*



SALES OFFICES: Atlanta, Birmingham, Ala., Cambridge, Mass., Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Dayton, Detroit, Fort Wayne, Greensboro, N. C., Houston, Indianapolis, Jacksonville, Kansas City, Mo., Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Rochester, N. Y., San Francisco, St. Louis, Seattle, Washington, D. C.

**1 TRIPLOC PLUG SHELL TAKES
24 INTERCHANGEABLE
AND REVERSIBLE
CONTACT INSERTS**



IMPROVED
TRIPLOC®
CONNECTORS



THE
PYLE-NATIONAL
COMPANY

Industry's most adaptable—most versatile general duty plug and receptacle line . . . for power, control, electronic and thermocouple circuits in U/L circuit breaking ratings up to 20 amperes 250 volts, D.C.—460 volts, A.C.

Pyle-National's Triploc is the finest line of connectors on the market today, in its electrical rating and general application class. In the Triploc compact size and price range, no other connector can approach its rugged construction for industrial service . . . or equal the hundreds of optional shell assembly combinations possible with the standard 1 to 12 pole interchangeable and reversible contact inserts. Combinations up to 48 poles are easily assembled in enlarged shells which gang 2, 3 and 4 standard inserts. Water-tight shells also 2-wire and 3-wire fusible plugs are available.

New, Enlarged Wiring Space. Triploc's cadmium plated, pressed steel shells are of strong, low-weight design and provide ample wire terminating space for all inserts.

Self-Locking Triploc Plugs are available with automatic cord-strain release or with manual twist release only.

Wide Choice of Wire Terminals. Contact inserts are available with binding screw terminals—back wired, side wired, or pressure eyelet type; solder well type; crimp type.

Midget Triploc Round Prong Series is available in 2, 3 and 4-pole ratings of 20 amperes, 125 volts A.C.; 15 amperes, 125 volts D.C.; 10 amperes, 277 volts A.C.

Sold nationally through authorized distributors. Write for bulletin 1252-B-C.
WHERE QUALITY IS TRADITIONAL

1344 North Kostner Avenue, Chicago 51, Illinois

Branch Offices and Agents in Principal Cities of the U.S. and Canada
Railroad Export Department: International Railway Supply Co., 30 Church St., New York 7, N.Y.
Industrial Export Department: Rocke International Corp., 13 E. 40th St., New York 16, N.Y.
Canadian Agent: The Holden Co., Ltd., Montreal

CONDUIT FITTINGS • MOTOR CONTROLS • SWITCHES • LIGHTING FIXTURES • FLOODLIGHTS

For the
first time
in wiring device
history . . .
a product

So Different

So Daring

So Dramatic . . .

it took a Fashion Show
to introduce it!

PLEASE TURN THE PAGE

THEY CAME TO SEE FASHION PLATE
INTRODUCED AT NEW YORK'S
FASHIONABLE HOTEL PIERRE!
AND HERE'S WHAT THEY SAID . . .



Miss Audrey Leeds, Fashion Coordinator—"FASHION PLATE proves that it's the little things that count. Just the idea that FASHION PLATE can be backed up with wallpaper or fabric, or painted to match or contrast with walls is enough to set women's imagination to work. It's about time someone got rid of that little black handle sticking out of a piece of metal. And another thing, it's easy to work without breaking a fingernail."



Mr. Clifton E. Smith of Jaros, Baum and Bolles—"I'm impressed by the fact that FASHION PLATE is not only a device that will blend well with any design, but, in addition, it's a high-quality switch . . . top grade for any job."



Mr. William Leibfried, Electrical Contractor—"Our reaction to FASHION PLATE can be easily expressed: we like it! The fact that we're planning to install it soon in future buildings should tell the story."

Fashion Plate



Mr. Larry Kaye, Shell Electric Supply Corporation—"Here's something that's really new and different. There's no doubt that this will add immeasurably to our sales and profits on wiring devices."



Mr. William E. Katzenbach, President of Katzenbach & Warren, interior designers and stylists—"We strongly recommend the use of FASHION PLATE. Its chameleon character provides a wall source for light that becomes a part of the wall decoration, and which can harmonize with any color or period of decor."

AT LAST! An exciting new wall switch that obsoletes every wall switch in America today!

Bryant's new FASHION PLATE* is being hailed by architects, engineers, builders, electrical contractors and building owners as . . .

"revolutionary" . . . "outstanding" . . . "long needed" . . . "a welcome change from tired old ideas"!

THAT'S IT! FASHION PLATE is a *new idea*!

It's a *bright new idea* that means millions of profitable installations for electrical contractors!

It's a *bright new idea* that lets architects and designers better satisfy their clients!

It's a *bright new idea* that gives you an exciting new talking point!

FASHION PLATE is destined to sweep across America as no other wiring device ever has! Already (even before mass production), FASHION PLATE has been specified for some of the great new buildings now under construction. FASHION PLATE has even commanded *last-minute* specification changes by people who want the ultimate in wall switch convenience and attractiveness!

That's Bryant's *startlingly new* FASHION PLATE!

*Trade-Mark

by Bryant

**NOW! FOR A FIRST-HAND LOOK AT THE SWITCH
THAT HAS EVERYONE EXCITED . . . TURN THE PAGE!**



and here it is . . .

Fashion Plate

Bryant's contribution to a bright, new, profitable era in wiring devices!

Features? JUST LOOK AT THEM!

No button! No toggle! Just a smooth surface!

Quickly interchangeable with conventional switches!

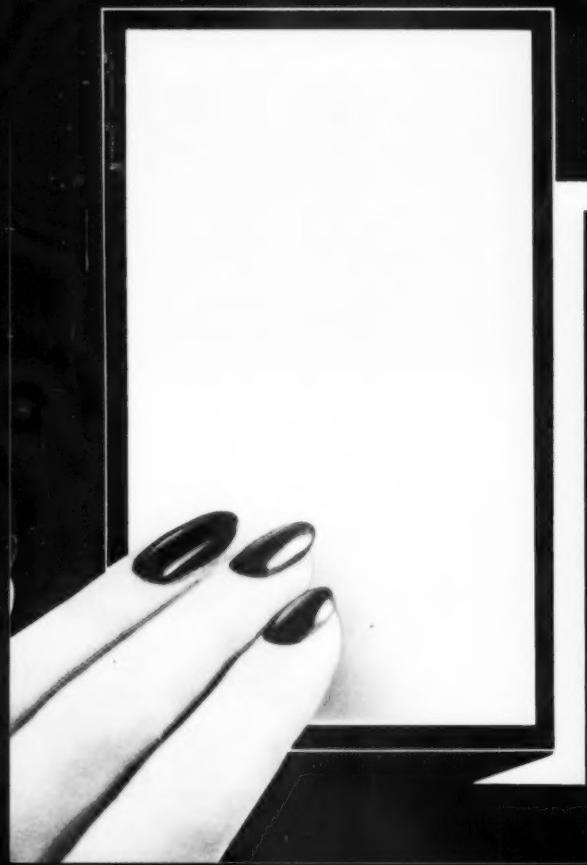
Contrasting combinations of black or white frames with clear or ivory actuator plates.

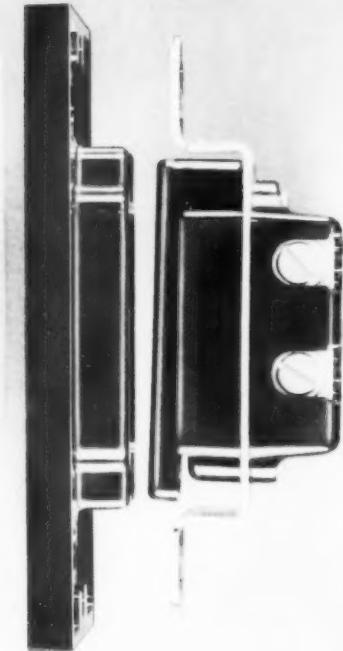
Optional clear actuator can be backed with paint, fabric or wallpaper. A decorator's dream!

Specification grade — a-c only 15, and 20 amps. 120-277 volts. No derating for fluorescent loads. Available in single-pole, 2-pole, 3- and 4-way.

Motor rated.

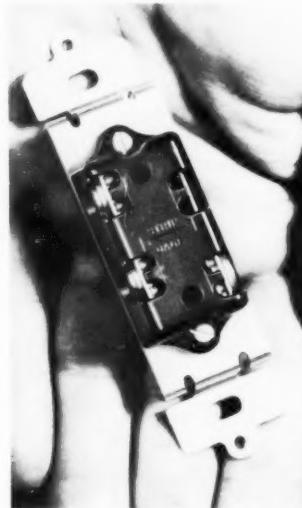
Light operating pressure.



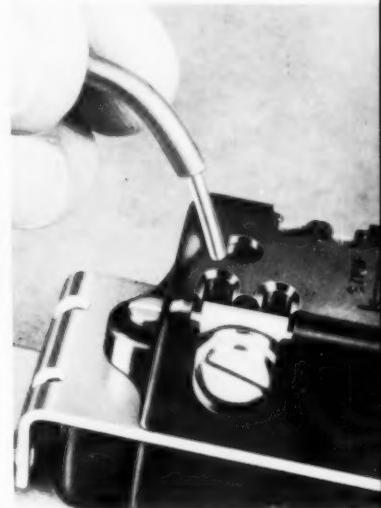


Smooth, quiet action. Low installation cost. No plate screws needed . . . just press on plate.

Silver alloy contacts insure long life. Quick make, slow break contact action. Positive pressure between contacts.



Compact design . . . fits all standard switch boxes.



Time-saving clamp type back wiring terminals. Splice-eliminating feed-thru terminals on single-pole and 3-way switches.

AMAZING NEW FASHION PLATE MAKES ALL OTHER SWITCHES OLD-FASHIONED!

It's true! This revolutionary design, backed by Bryant quality, obsoletes every wall switch in America today. FASHION PLATE is the easiest switch of all time to sell. Customers want it. It fascinates them. And best of all, it will pack in profit for every distributor and contractor who features it. It's brand new! Newer than new! FASHION PLATE is your key to real profits from wiring devices!

JI-99012

The exciting things come from

BRYANT

THE BRYANT ELECTRIC COMPANY
BRIDGEPORT 2, CONNECTICUT
Chicago • Los Angeles

CONTRACTORS:

Ask your favorite electrical wholesaler about FASHION PLATE. Test it! Try it! FASHION PLATE is easy to sell your customers . . . puts added profit dollars in your pocket!

BRYANT WHOLESALERS:

Bryant salesmen are writing orders all over the country! If you haven't been contacted yet, please be patient; we'll be there just as fast as possible! If you're in a BIG hurry to get FASHION PLATE, wire, write or telephone JOHN MUNSON, Sales Manager, The Bryant Electric Co., Bridgeport 2, Conn. Phone Edison 4-5161. We'll rush your order to you.

The Bryant Electric Company
Bridgeport 2, Connecticut

Please send additional information on
FASHION PLATE.

Name _____

Title _____

Company _____

Address _____

City _____ Zone No. _____ State _____

"PRE-ENGINEERED" VENTILATION



— another example of how you benefit when you install American Blower ventilating equipment

Show your prospects how to improve employee efficiency and morale quickly, economically. Sell them good ventilation, pre-engineered by American Blower.

Sales point: No on-the-job engineering is needed when your customers ventilate with American Blower equipment. Our engineers already have designed and tested a fan exactly right for *any* job. So it's easy to pick the proper model directly from the catalog. And you offer buyers even more:

- **Packaged ventilation** — Complete, ready to use. Fast, economical installation.
- **"Off-the-shelf" delivery** — Fast service from local stocks on most models.
- **Certified Ratings** — Air deliveries meet rigid standard test codes.

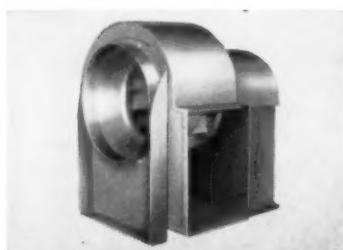
Ring up *more* sales with the *complete* line of American Blower fans for every ventilating job. Bonus: equipment selection assistance from one of our 73 branch offices. For details, write: American-Standard,* American Blower Division, Detroit 32, Mich. In Canada: Canadian Sirocco products, Windsor, Ontario.



It pays to standardize on American Blower!



Ventura Fans — quiet, efficient, economical. Sizes from 10" to 30".



Utility Sets — Direct drive, sizes 3" to 12½"; V-belt drive, 9" to 36".

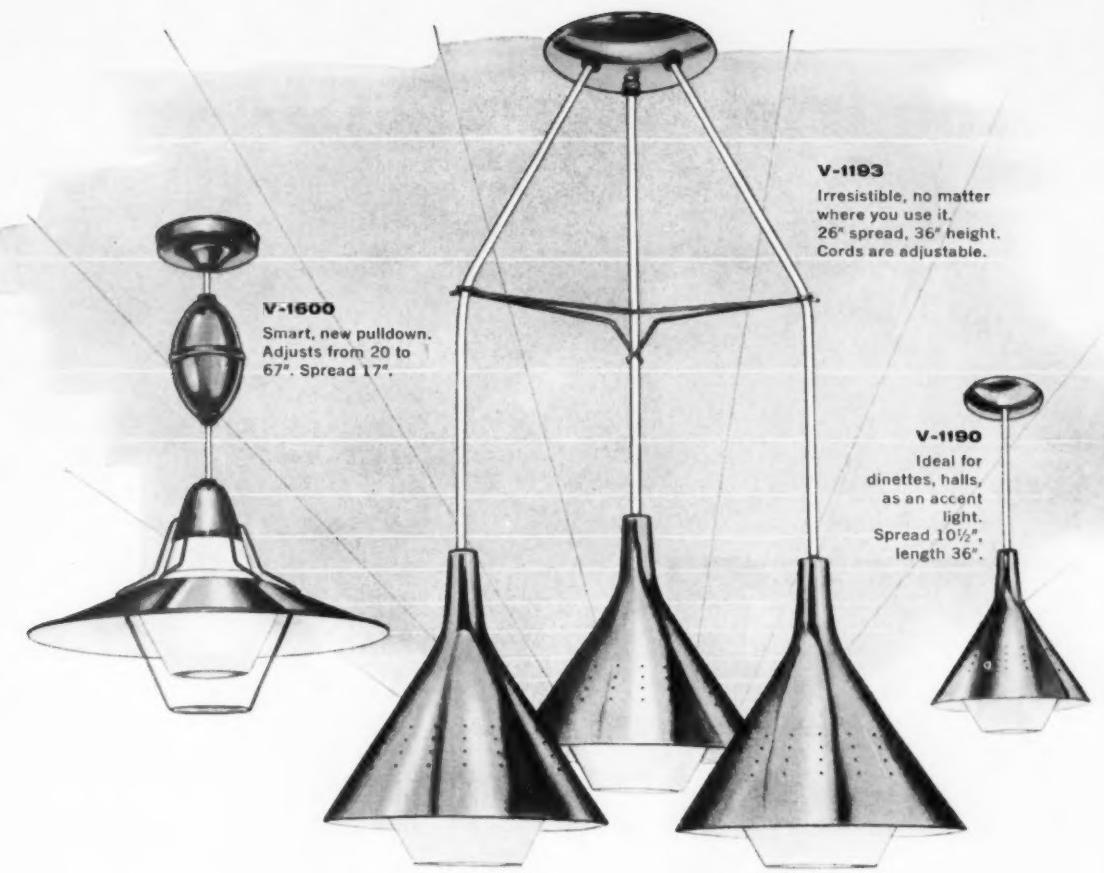


Power Roof Ventilators — available through American Blower branches.

* AMERICAN-STANDARD and Standard® are trademarks of American Radiator & Standard Sanitary Corporation.



AMERICAN-STANDARD
AMERICAN BLOWER DIVISION



the Gleam of...

the Sparkle of...

...to capture her heart and clinch the sale!

Old world elegance, new world styling, that's the happy blending Virden offers in its new line of Brass 'N Glass lighting fixtures. Of imported glass and gleaming brass, these fixtures have the sales excitement that makes prospects say "yes," will increase your profits per job.

Virden distributors in all major cities have these fixtures on display now. For the name of the one nearest you, look in the yellow pages of your telephone book. For a colorful brochure (V-100) write John C. Virden Company, Dept. ECM, 5209 Euclid Avenue, Cleveland 3, Ohio.



VIRDEN
Member American Home
Lighting Institute

Another new development using

B.F.Goodrich Chemical *raw materials*



"Zippertubing" is produced in standard lengths from 25 to 1000 feet, in varying sizes and colors, by The Zippertubing Company, Los Angeles. Shielding material used in it is manufactured by Cordon Chemical Corporation. B.F. Goodrich Chemical Company supplies the Geon polyvinyl material.

**New shielding and jacket
made with Geon can be zipped on
in a single operation**

Production and maintenance of wire harnesses are greatly simplified with this new shielding and jacket combination made with Geon polyvinyl material. All you do is zip it on. Saves time and equipment during manufacture—makes it easy to replace the jacket if it has to be removed to get at wiring for service.

For regular RF shielding, glass cloth saturated with Geon polyvinyl material is laminated to aluminum foil. It gives 100% coverage to provide immediate grounding of RF and UHF interference. The outer surface, also of Geon, has

zipper tracks sealed in. A pull tab can easily be used to facilitate closure.

For heavier magnetic shielding, special steel foil is laminated between layers of Geon. Lead saturated glass cloth is available for radiation problems.

Geon provides high insulation resistance, heat stability and extra strength, as well as accuracy in molding. It's another example of versatile Geon proving the key to a dramatic new product. For information, write B.F. Goodrich Chemical Company, Dept. LS-5, 3135 Euclid Avenue, Cleveland 15, Ohio.



B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company



GEON polyvinyl materials • HYCAR American rubber and latex
GOOD-RITE chemicals and plasticizers • HARMON colors



**How to make money
foot after foot**

Self-dispensing Carton with Inventory Keeper to minimize waste

Color-coded Labels to instantly identify insulation—red and white for neoprene, black and white for rubber

Foot-after-foot Imprint shows at a glance the gauge, number of conductors and type of insulation

Why settle for less?
When you call for cable, call for Carol.

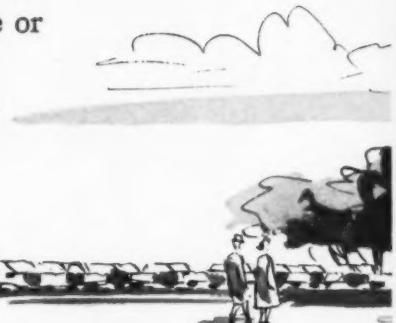


CAROL CABLE COMPANY

Division of The Crescent Company, Inc.
Pawtucket, Rhode Island

It's easy to select exactly the from General Electric's

You can select and install exactly the underfloor wiring system you need for any building, large or small, or for any power distribution problem from these 3 great General Electric underfloor wiring systems:



1. G-E cellular-steel floor wiring system is designed to eliminate installation difficulties. Precision-made components and easy-to-use lengths of header duct minimize cutting and fitting on the job. G-E header now offers 41% additional capacity yet fits the normal 2½ inches of concrete. Services are completely separate.



2. G-E two-level steel underfloor wiring system offers complete separation of services and flexibility of layout. Wire-pulling is easier because of the unique design. A minimum fill of 3½ inches is required for the two-level system.

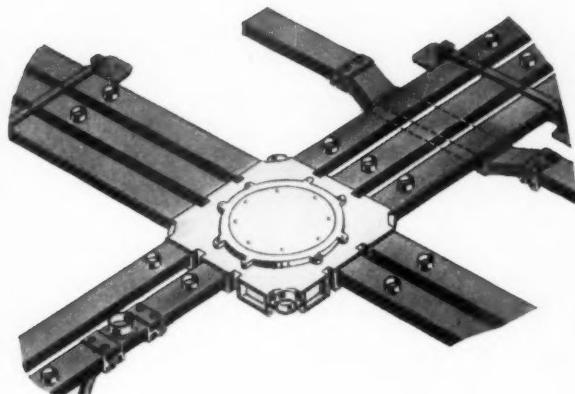
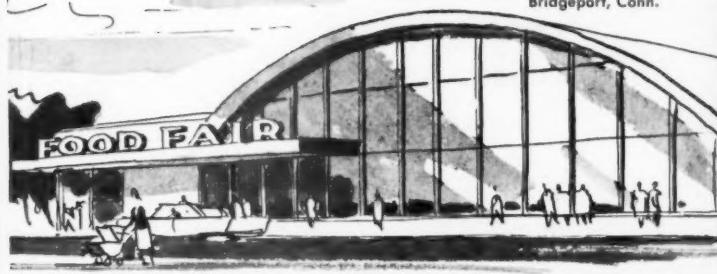


Progress Is Our Most Important Product

GENERAL  **ELECTRIC**

underfloor wiring you need three systems

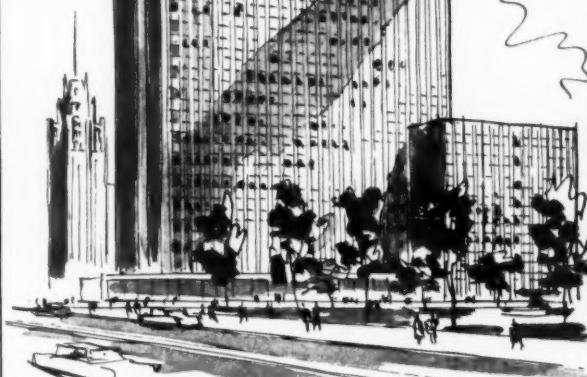
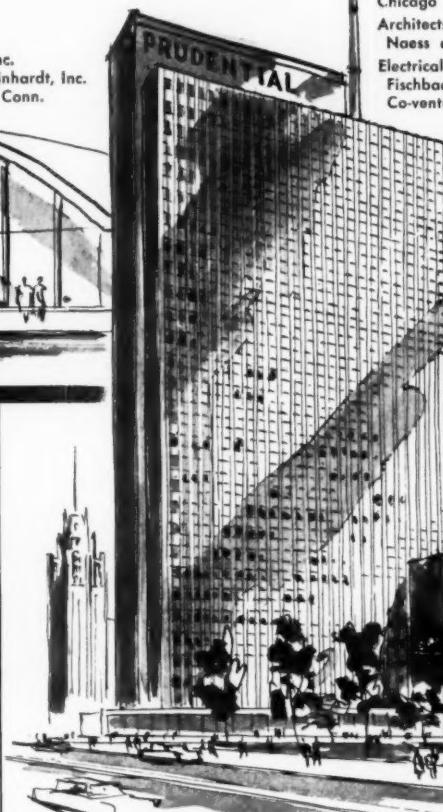
Food Fair, Fairfield, Conn.
Designed by: Food Fair Stores, Inc.
Electrical Contractor: Geo. J. Steinhardt, Inc.
Bridgeport, Conn.



3. **G-E single-level steel duct system** is ideal for standard layouts with up to 3 services; it can be used in slab and fill or monolithic floors. Designed for easy installation, this system can be installed in fills as shallow as 2½ inches.

The Prudential Insurance Company of America Building, Chicago

Architects—Engineers:
Naess and Murphy, Chicago
Electrical Contractor:
Fischbach-Livingston-Comstock,
Co-venturers, Chicago



All 3 G-E underfloor wiring systems are simple to install. Component parts fit together without difficulty—save time on the job. That's because the design is straightforward and each system is made to close tolerances. G-E field representatives help you plan your system, if desired, and they stay with the job until installation is satisfactorily under way. These steel systems provide excellent grounding facilities. Components are available from General Electric to meet virtually every installation requirement. Underwriters' Laboratories, Inc. lists all 3 G-E systems which also meet Federal Specifications.

Send your questions
about underfloor wiring
to General Electric,
or mail the coupon
for complete information.

To: General Electric Company
Conduit Products Department, Section C85-1018,
Bridgeport 2, Connecticut

Please send me complete information on:

G-E two-level and single-level steel underfloor wiring systems.

G-E cellular-steel floor wiring system.

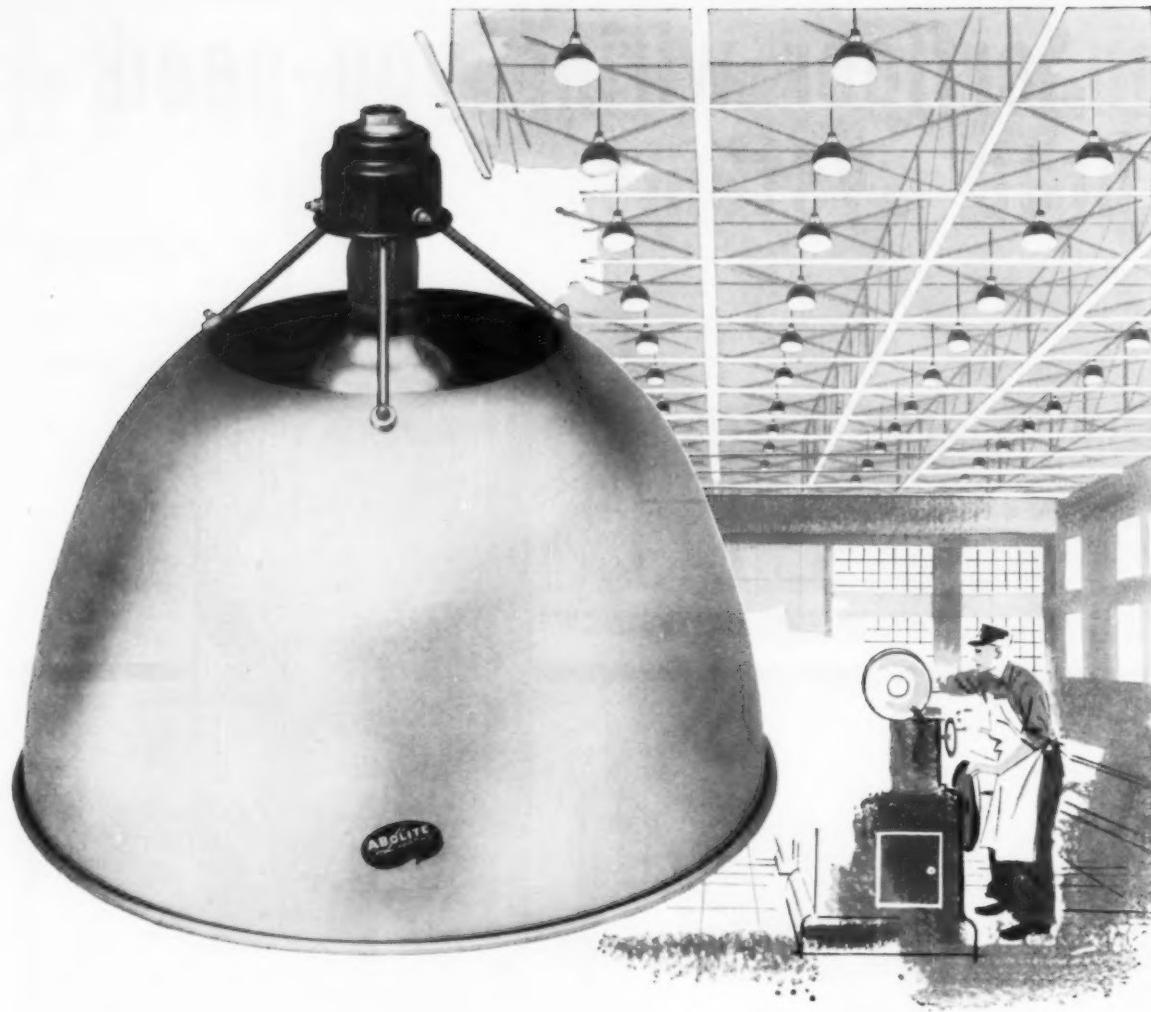
Enclosed is a description of my underfloor wiring problem. What do you suggest?

Name _____ Title _____

Company _____

Address _____





**NOW ABOLITE BRINGS "OFFICE TYPE" EYE COMFORT
TO INDUSTRIAL HIGH BAY LIGHTING**

Eye fatigue is reduced, workers are more efficient with "glareless" high bay lighting from Abolite up-light units. Uncomfortable contrasts of bright lamps against dark background are eliminated by light directed upward through Abolite's open top. This light (18%) washes out the deep shadows, gives lamps a soft background. 35° shielding practically eliminates glare.

Open-top design also gives Abolite high bay units a self-cleaning action that keeps maintenance at a minimum. Air circulates through the fixture and sweeps it clean of dulling dust.

There are four Abolite uplight units for high bay lighting: 18" and 24" diameter Alzak aluminum fixtures for use with 400 and 1000 watt mercury lamps; 14" and 18" Alzak aluminum fixtures for 500 watt incandescent lamps (ideal for gymnasium lighting). For full information on these units, see Sweet's Industrial Construction File, 12i/AB, or write *Abolite Lighting Division, The Jones Metal Products Company, West Lafayette, Ohio*.

ABOLITE
Lighting

THE JONES METAL PRODUCTS COMPANY
West Lafayette, Ohio

new!



slotted angle

TRIPLE THREAT TO HIGH INSTALLATION COSTS!

You can reduce costs three ways on every electrical installation with this versatile new Acme Steel framing material. Savings in installation time alone can cut your costs up to 40%. Savings on the initial material cost mean even greater economy. And AIM Brand Slotted Angle eliminates the other difficulties that can crowd your profit margin. For instance, all standard electrical fittings can be used. Handling and storing are simple. Big inventories are unnecessary. And you can work with AIM Brand Slotted Angle right on the job-site.

All-new AIM Brand Slotted Angle is ideal for supports and mountings for every kind of electrical installation. Repeating slot-and-round-hole pattern provides ready-made openings for anchoring. Slots and holes accept $\frac{3}{8}$ " common bolts for equipment attachment. Cold-rolled galvanized steel assures dependable strength and rigidity. 10 or 12 foot lengths come in packages of 10 pieces with bolts and nuts. Available in two sizes: Standard 225-80 ($\frac{2}{4}$ " x $1\frac{1}{2}$ " x .080") and Heavy-duty 300-104 (3" x $1\frac{1}{2}$ " x .104").

FREE! Get ideas from the AIM Brand Slotted Angle brochure for fixtures and equipment you can build with less material, fewer manhours. Write Dept. EBD-108, Fabricated Materials Division, Acme Steel Company, Chicago 27, Ill.

**No welding, no drilling, no special skills needed...
Just**



**ACME
STEEL**

AIM Brand Slotted Angle

where you can get
AIM Brand Slotted Angle

ALABAMA

Birmingham, Moore-Handley
Mobile, Moore-Handley

ARIZONA

Phoenix, Graybar Electric Co., Inc.
Tucson, Graybar Electric Co., Inc.

CALIFORNIA

Fresno, Graybar Electric Co., Inc.
Long Beach, Graybar Electric Co., Inc.
Los Angeles, Graybar Electric Co., Inc.
Oakland, Graybar Electric Co., Inc.
Sacramento, Graybar Electric Co., Inc.
San Bernardino, Graybar Electric Co., Inc.
San Diego, Graybar Electric Co., Inc.
San Francisco, Graybar Electric Co., Inc.
Santa Ana, Graybar Electric Co., Inc.

CONNECTICUT

New Haven, Graybar Electric Co., Inc.

ILLINOIS

Chicago, Efengee Elec. Supply Co., Inc.
Englewood Elec. Supply Co.
Rockford, Englewood Elec. Supply Co.
Waukegan, Interstate Electric Supply Co.

INDIANA

Evansville, Evansville Supply Co.
Fort Wayne, National Mill Supply, Inc.
Gary, Englewood Electrical Supply Co.
South Bend, Englewood Elec. Supply Co.

LOUISIANA

Monroe, Weaks Supply Co.
Shreveport, Weaks Supply Co.

MAINE

Portland, Graybar Electric Co., Inc.

MARYLAND

Baltimore, Tristate Elec. Supply Co., Inc.
Cumberland, Tristate Elec. Supply Co., Inc.
Frederick, Tristate Elec. Supply Co., Inc.
Hagerstown, Tristate Elec. Supply Co., Inc.

MASSACHUSETTS

Boston, Graybar Electric Co., Inc.
Springfield, Graybar Electric Co., Inc.
Worcester, Graybar Electric Co., Inc.

MINNESOTA

Duluth, Graybar Electric Co., Inc.
Minneapolis, Graybar Electric Co., Inc.
St. Paul, Graybar Electric Co., Inc.

MISSISSIPPI

Natchez, Weaks Supply Co.

MISSOURI

Kansas City, Graybar Electric Co., Inc.
NEW HAMPSHIRE

Manchester, Graybar Electric Co., Inc.

NEW JERSEY

Morristown, Morristown Elec. Supply Co.
Newark, Graybar Electric Co., Inc.
New Brunswick, Metro Elec. Supply Co.
Woodbridge, Hansen & Yorke Co. of N. J.

NEW YORK

Long Island City, Graybar Electric Co., Inc.
New York, Hansen & Yorke Co., Inc.

OHIO

Akron, Graybar Electric Co., Inc.
Cincinnati, Graybar Electric Co., Inc.
Cleveland, Graybar Electric Co., Inc.
Toledo, Graybar Electric Co., Inc.
Youngstown, Graybar Electric Co., Inc.

PENNSYLVANIA

Chambersburg, Tristate Elec. Sup. Co., Inc.
Harrisburg, Raub Supply Co.
Lancaster, Raub Supply Co.
Pittsburgh, Graybar Electric Co., Inc.
Williamsport, Raub Supply Co.

RHODE ISLAND

Providence, Graybar Electric Co., Inc.

SOUTH DAKOTA

Sioux Falls, Graybar Electric Co., Inc.

TENNESSEE

Memphis, The Reichman Crosby Hays Co.
Nashville, Moore-Handley

VERMONT

Rutland, Graybar Electric Co., Inc.

VIRGINIA

Harrisonburg, Tristate Elec. Supply Co., Inc.
Winchester, Raub Supply Co.

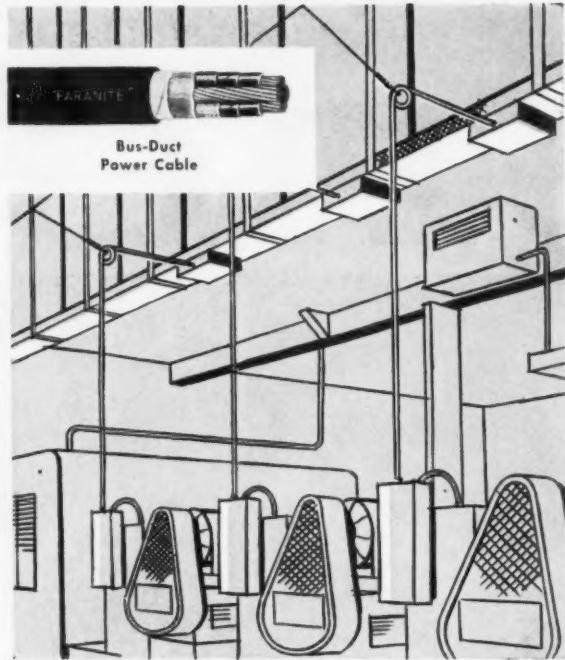
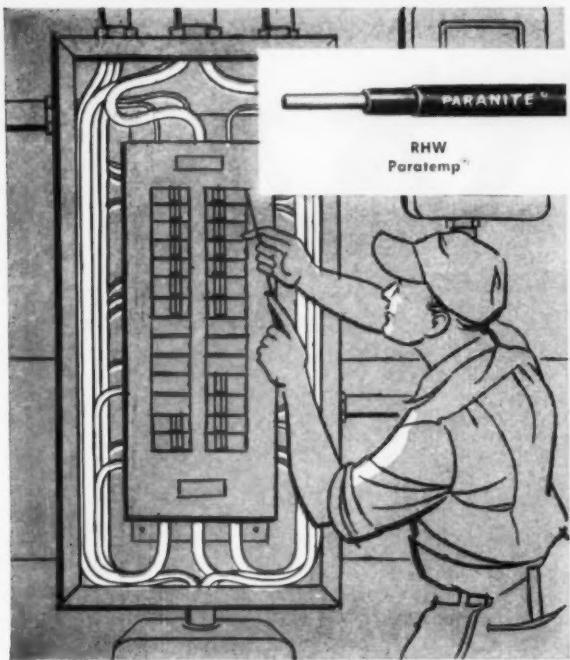
WEST VIRGINIA

Charleston, Graybar Electric Co., Inc.

WISCONSIN

Milwaukee, Hein Electric Supply Co.





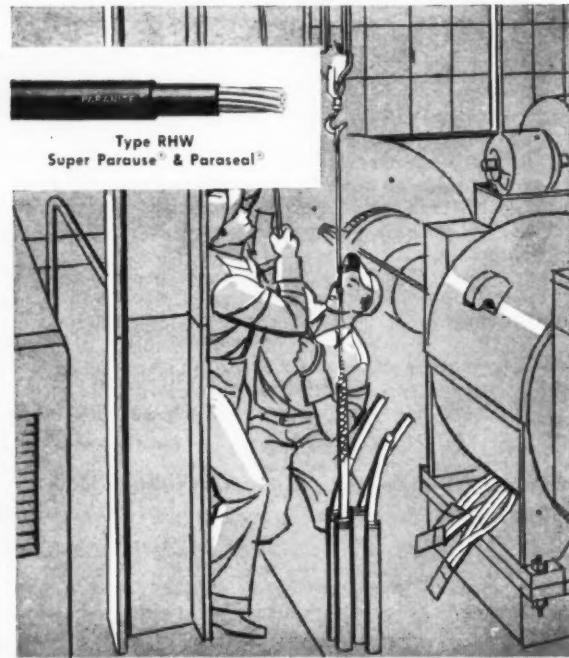
From Source to Service with [®] **PARANITE**



PARANITE WIRE AND CABLE DIVISION

Essex Wire Corporation
FORT WAYNE 6, INDIANA

MANUFACTURING PLANTS: Birmingham,
Alabama; Anaheim, California; Jonesboro,
Indiana; Marion, Indiana; Tiffin, Ohio



Sales Offices in all Principal Cities . . . Sold only through Recognized Electrical Distributors

ONLY HEINEMANN CIRCUIT BREAKERS

give you all — **THREE**

1

A DEFINITE RATING . . .

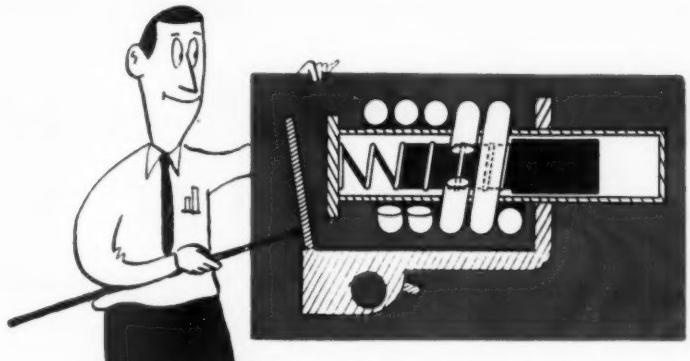
unaffected by temperature. A 20 ampere rating means 20 amperes of safe, usable capacity. There is no de-rating of Heinemann Circuit Breakers.



2

INVERSE TIME DELAY . . .

prevents nuisance power interruptions . . . permits starting inrush and harmless, temporary overloads. Gives maximum protection without inconvenience.



3

SELF-ADJUSTING TIME ELEMENT . . .

varies time delay, *not the rating or instantaneous trip point*, to allow more time to make cold starts or to shorten delay under dangerous heat conditions.

HEINEMANN

Circuit breakers

HEINEMANN ELECTRIC COMPANY

132 PLUM STREET
TRENTON 2, N. J.



UL approved for direct cable burial, Rome's FlexAll makes it easy for you to keep the wiring out of sight.

How Rome's multi-purpose UF cable can help you "sell up" outdoor lighting

and get those extra wiring jobs that mean more profit

By "selling up" when contracting to wire a home, you can increase the amount of extra lighting you install—such as carriage lamps—and thereby boost your profits.

Rome's FlexAll—a nonmetallic sheathed UF cable—can help you get a larger number of outdoor residential lighting jobs. Low in price and easy to install, FlexAll reduces your installation costs and enables you to quote a more attractive price when "selling up" additional lighting.

Installs easily, lasts for years. FlexAll, when provided with overcurrent protection, is ideally suited for direct burial in the earth and its flexibility makes

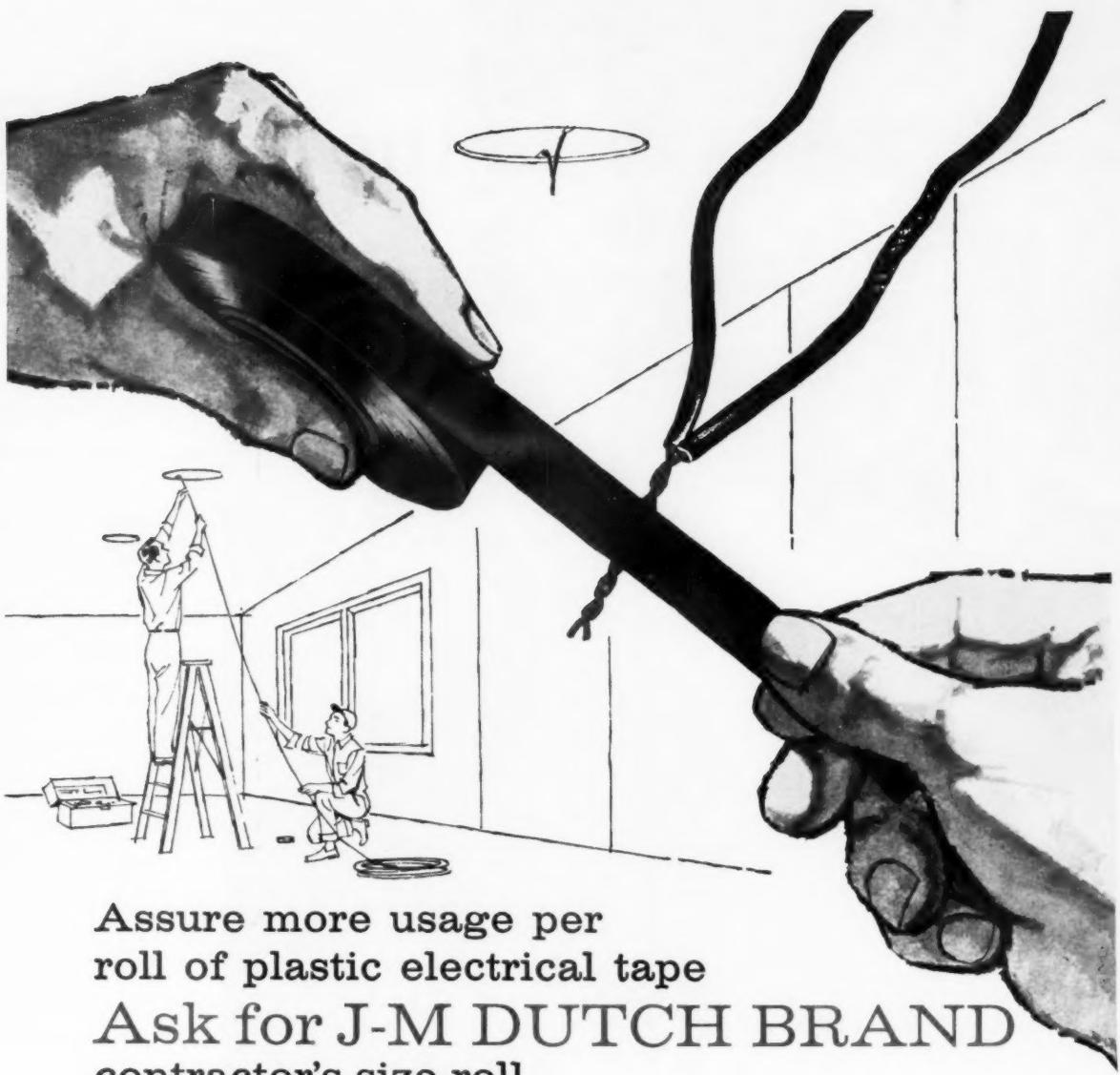
it easy to handle. Insulated with Rome Synthol (polyvinyl chloride) thermoplastic compound, FlexAll provides exceptional resistance to the corrosive elements in the earth. In addition, it has high dielectric strength and excellent aging characteristics.

Helps you to "sell up." Merchandise your services, don't just make them available. Sell your customers on filling

their future needs *now*. Get that extra wiring—lights for the barbecue pit—gate lights—post lanterns—and *keep the wiring out of sight*. FlexAll permits you to put more wiring into many of your residential wiring jobs.

Specify Rome's FlexAll for your next job. Contact your nearest Rome Cable representative for more information—or write to Department 346, Rome Cable Corporation, Rome, New York.

ROME CABLE
CORPORATION



**Assure more usage per
roll of plastic electrical tape
Ask for J-M DUTCH BRAND
contractor's size roll.**

Contractors find they save money with Dutch Brand's convenient packaging and complete line of tapes. For example, our contractor's-size roll of plastic electrical tape is a full 44 feet in length. This special size—exclusive with Dutch Brand—allows far greater economy in allocating materials to a job. Waste is cut to an absolute minimum for this is the length studies show a workman uses on an average job. Here's a worthwhile saving when you figure tape wastage per man and multiply it by the number of men in your crew. Yet, this 44-ft. roll costs you *no more* per foot than larger rolls.

Dutch Brand Plastic Electrical Tapes are avail-

able in 44-ft. and 66-ft. rolls. They're thin, strong, flexible—offer unusual resistance to acids, alkalies, oil, solvents, fungus, bacteria, gases. Made to meet the highest industry standards. Ask your supplier for Dutch Brand now. *Johns-Manville Dutch Brand Products, 7800 South Woodlawn Avenue, Chicago 19, Illinois.*

**WRITE FOR NEW
BOOKLET!**

Looking for new ideas on tape as a time-and-money-saver? Ask for "Big Four in Electrical Tapes." Do it today!



JOHNS-MANVILLE

100 YEARS OF QUALITY PRODUCTS 1858-1958

So easy on the eyes of



This handsome new bank and office building in Fort Worth, Texas, houses the Mutual Savings & Loan Association. Architect: Preston M. Geren. Consulting Engineer: Yandell, Cowan & Love Engineering Co.

Texas...

Curtis Visioneers provided high levels of illumination, Eye-Comfort diffused lighting . . . blending with modern low-ceiling architectural design . . . at Fort Worth savings and loan company

An office where banking transactions are made has a special need for lighting that assures visual acuity. Fort Worth's Mutual Savings and Loan Association was faced with this problem: how to achieve modern low-ceiling construction, yet obtain high levels of illumination without objectionable shadows or glare. Solution: Drawing from a wealth of experience, Curtis created a continuous luminous ceiling through use of Strato-Lux. Result: a lighting system compatible with the modernistic low-ceiling design of the building —that provided high intensity lighting with even-panel illumination . . . yet delivered low brightness quality. No glare, no distracting shadows or eye strain. Using standard products, with slight modifications to satisfy your job requirements, when necessary, Curtis visioneers can assist you, whatever your commercial lighting needs. So write today for the name and address of the Curtis Visioneer in the principal city nearest you.

Curtis Lighting, Inc., 6135 West 65th St., Chicago 38, Ill. In Canada: 195 Wicksteed Ave., Toronto 17 Canada.



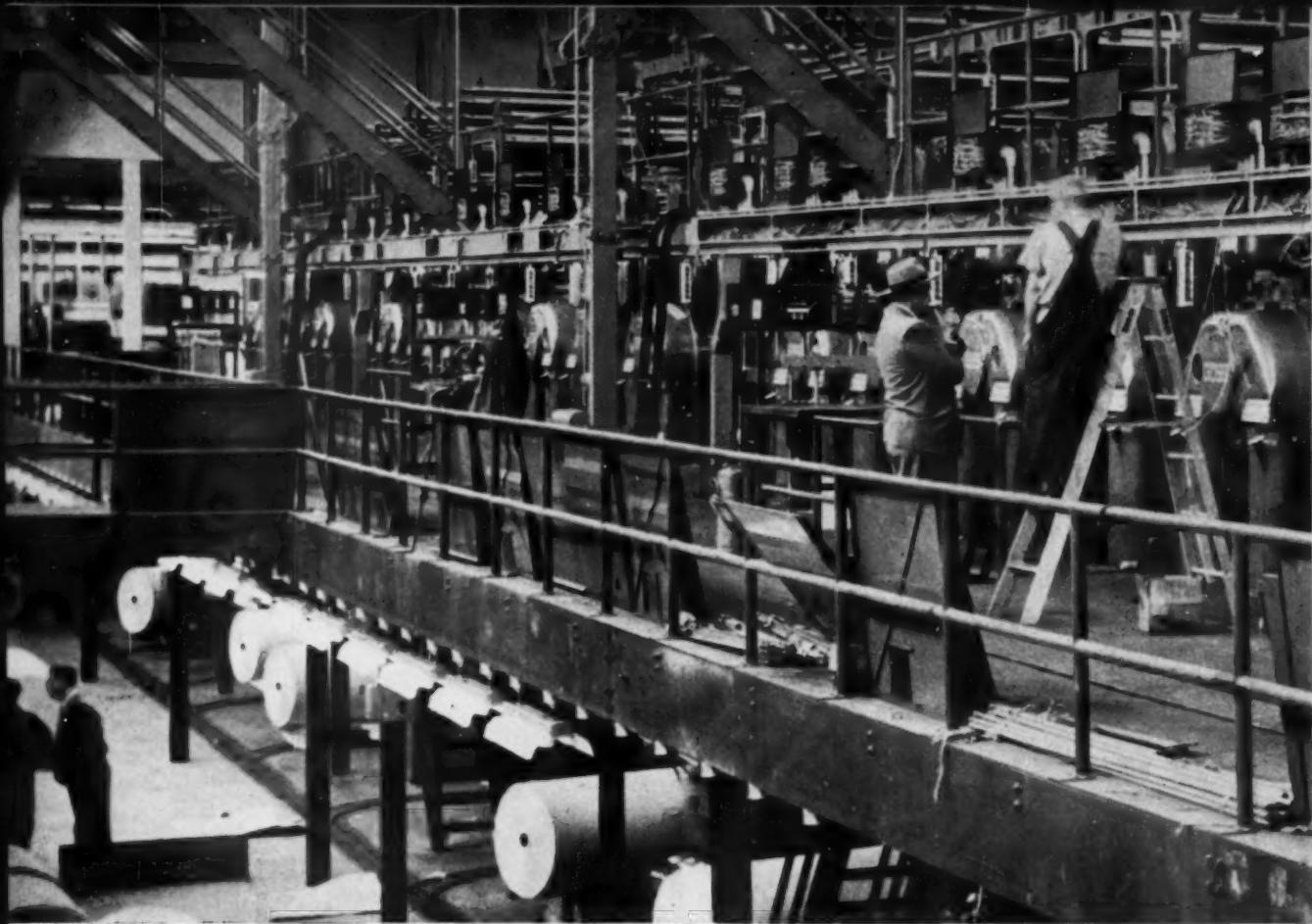
Curtis Strato-Lux provides high levels of glare-free illumination to promote efficiency and serenity. Exceptionally low ceiling brightness is achieved through use of #6025 Holophane acrylic plastic Controls.



Even with Strato-Lux directly overhead, there are no bright spots, no reflections, in critical viewing areas. Acrylic plastic panels never discolor, can be slipped out one at a time and dipped in detergent for cleaning.



Visioneers in Planned Lighting



The news behind the news—is that Anaconda's Densheath 900 feeds the power to these huge Goss presses at the Chicago Sun-Times' new Fort Dearborn plant. Densheath 900's special heat-resistant insulation enables current to be carried.

AT THE CHICAGO SUN-TIMES

An extra margin of safety and increased are provided by Anaconda's new



Electrician laces in Anaconda Densheath 900 for a 50-hp press-drive motor. In addition to three master panels, each press has its own control panel.

Nothing "spoils" as fast as news. Thus, in a newspaper operation, there's no time for machine breakdowns, costly delays. The news *must* get out!

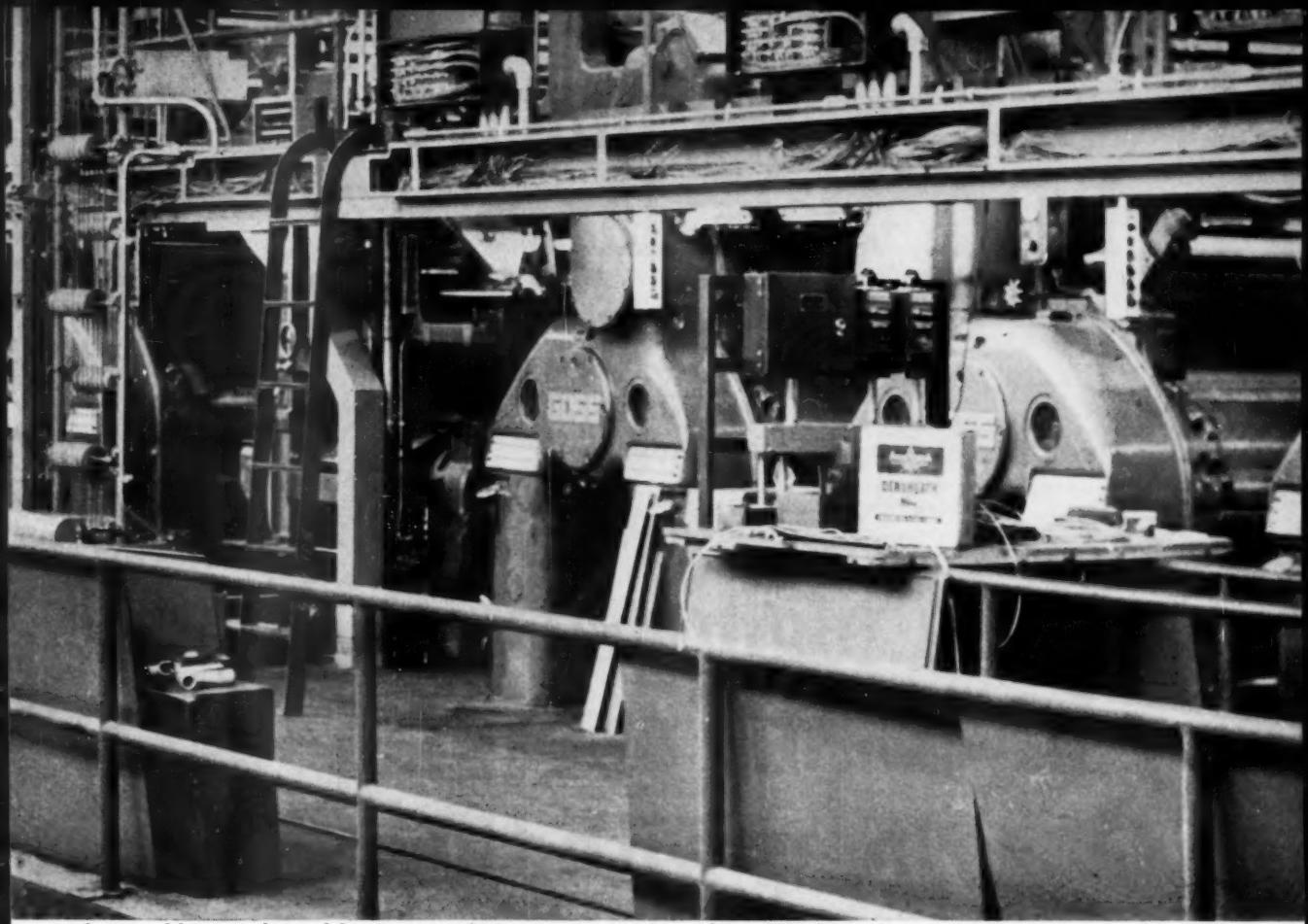
To see that it does—at the Chicago Sun-Times—Anaconda's Densheath 900 is on the job powering 30 giant Goss presses, plus teletypes, intercom systems, office equipment.

In *your* business, too, power failures can mean *serious* losses. Densheath 900 has the "*built-in*" extra performance your important circuits require.

Tough, flexible Densheath 900, then, deserves attention. This top-quality industrial wire is sound insurance against power failure. Here's why:

- 1 **LONG LIFE.** Consistently superior performance throughout the years under the severest operating conditions.
- 2 **HIGH HEAT RESISTANCE.** Can safely carry higher currents under exposure to higher ambient temperatures.
- 3 **CHEMICALLY STABLE.** Retains its electrical and physical characteristics despite exposure to cutting compounds, lubricants, most acids and alkalies.
- 4 **MOISTURE RESISTANCE.** The presence of moisture does not affect the satisfactory performances of Densheath 900.
- 5 **EASY TO INSTALL.** Flexible, easily formed, resists tearing, abrasion and stretching, strips easily.
- 6 **LESS "DRAG."** Coated with exclusive new "slipper" coat which offers less drag, greater resistance to scraping.

If yours is a plant now going to higher ambients, or higher temperature operations in corrosive atmospheres, Densheath 900 will be of particular interest. It provides an extra margin of safety for those "hot spots" which



ried more safely . . . is designed for exposure to higher temperatures than ordinary PVC thermoplastic materials. Architects for the new building were Naess and Murphy, Chicago. Electrical Contractor: White City Electric Co., Chicago.

protection against power failures industrial wire – Densheath 900!

are always occurring . . . assures superior performance from your wiring. For contractors and distributors, Densheath 900 offers another advantage: it eliminates duplicate stocks, since the one wire can be used for building construction, appliance and machine tool applications. See the Man from Anaconda or your Anaconda Distributor about Densheath 900. Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y.

5804

RATINGS

The exceptional heat, chemical and moisture resistance of Densheath 900 enables it to satisfy the following:

- U/L requirements for type TW
- ASTM D 734 Polyvinyl Insulating Compound
- 90C Switchboard, Appliance and Machine Tool Wiring
- National Machine Tool Builders Association Specifications



DENSHEATH 900

Densheath 900, the 90C industrial wire, is the result of more than 20 years of Anaconda's research and development in the field of thermoplastic wire and cable. Its specially heat-resistant insulation handles current more safely . . . it is designed for exposure to higher temperatures than ordinary PVC thermoplastic materials.

Underwriters' Laboratories Inc. Labeling: Type TW, Oil Resistant 60 C. Sizes 14 Awg through 4/0-Awg also labeled as Appliance Wiring Material for use at temperatures not exceeding 90C, or not exceeding 60C where exposed to oil.

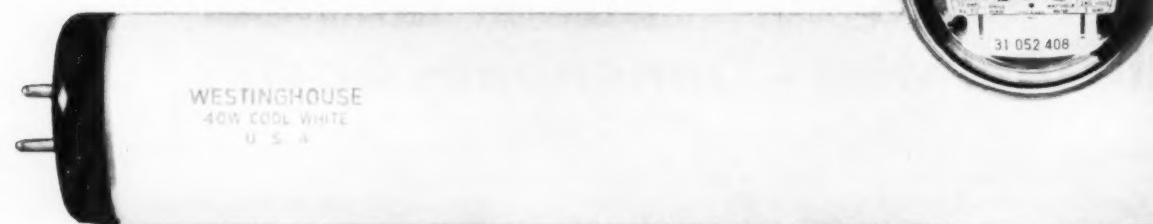
SEE THE
MAN FROM **ANACONDA**
FOR **DENSHEATH 900**



It costs you as much to light a lazy lamp...



as a Westinghouse with "Ultralume" phosphors ...the lamp with the **LONG BRIGHT LIFE!**



SOME FLUORESCENT LAMPS get "lazy" fast. They eat up the same amount of electricity, but grow dimmer fast. Only Westinghouse fluorescents stay bright as new... longer, because Westinghouse lamps have "Ultralume" phosphors!

"ULTRALUME" is an exclusive new Westinghouse phosphor that assures maximum brightness for the life of the lamp! "Ultralume" phosphors give you more light per foot of lamp, yet a Westinghouse costs no more to operate than any ordinary lamp.

ALL Westinghouse fluorescents have "Ultralume" phosphors . . . there's one for every business or home use. Specify Westinghouse on every lamp order. Call your local authorized Westinghouse agent or write—Westinghouse Lamp Division, Bloomfield, New Jersey.

Westinghouse FLUORESCENT LAMPS

**YOU GET
DOUBLE PROTECTION**
against corrosion...
against falling
or splashing liquids



TYPE DP
1 to 125 hp

with WAGNER
TYPE DP MOTORS
designed to meet more
application needs

Wagner Type DP Motors offer the *double protection* of rugged corrosion-resistant cast iron frames and dripproof enclosures so well designed that the DP Motor can handle many applications that formerly required splashproof motors.

These Wagner Motors are built in the new NEMA ratings that pack more power in less space, are lighter in weight and are easier to maintain.

SLEEVE BEARING MODELS AVAILABLE

The entire line of ratings through 125 hp is available with ball bearing construction as illustrated, or with steel-backed, babbitt lined sleeve bearings that have high load carrying capacity and provide quieter operation.

Let a Wagner Sales Engineer show you how these motors can be applied to your needs. Call the nearest branch office or write for Wagner Bulletin MU-223.

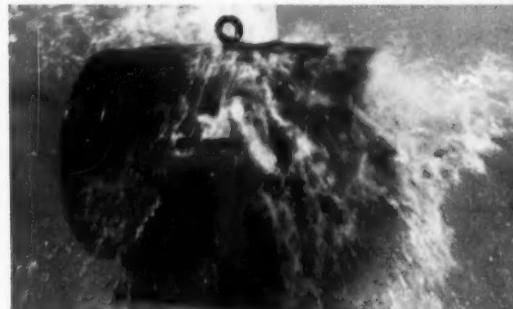
**1 to 125 HP—1750 RPM—40°C
NEMA FRAMES 182 through 445U**

Wagner Electric Corporation
6400 Plymouth Ave., St. Louis 14, Missouri.

WM58-9



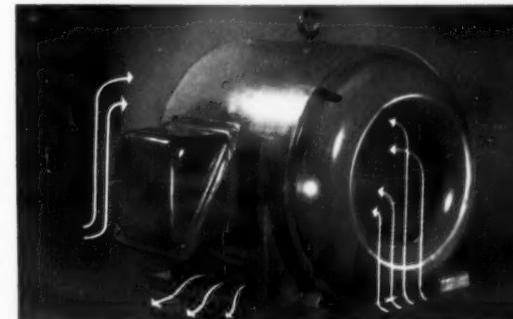
Air intakes and outlets are positioned to provide complete dripproof protection.



DOUBLY PROTECTED—Wagner DP Motors offer the double protection of completely dripproof enclosures and rugged cast iron frames that can take rough handling and resist corrosion.



CAN BE RELUBRICATED—Factory lubrication will last for many years in normal service—but openings are provided to permit the relubrication that adds years to motor life under severe conditions.



COOL RUNNING—Specially designed baffles direct cooling air through the motor to reduce stator temperature—thus increasing motor life. Blowers, cast as part of the rotor, move large volumes of air without noise or vibration.

**YOU GET
EXTRA PROTECTION
against corrosive...
abrasive or
explosive elements**



with Wagner totally enclosed motors... protected for longer motor life

If you need motors that will keep production rates up...that will give the continuity of service that is so important to automation...that will operate with complete dependability under the most severe conditions—Wagner totally-enclosed motors are your soundest choice.

Type EP Motors offer protection against corrosion, dust, abrasives, fumes, steel chips or filings. Type JP is explosion proof as well—designed and approved for use in explosive atmospheres.

1 TO 100 HORSEPOWER—4 POLE, 60 CYCLE—NEMA FRAMES 182 THROUGH 445U

Wagner Electric Corporation

6400 Plymouth Ave., St. Louis 14, Missouri. Branches and Distributors in All Principal Cities

HEAVY DUTY BALL BEARINGS

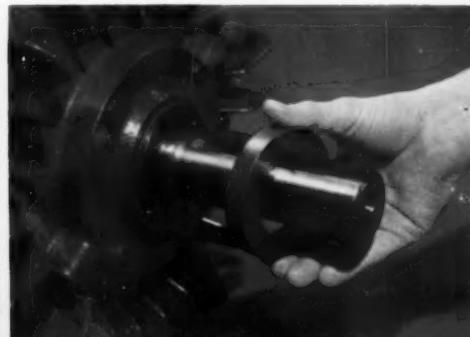
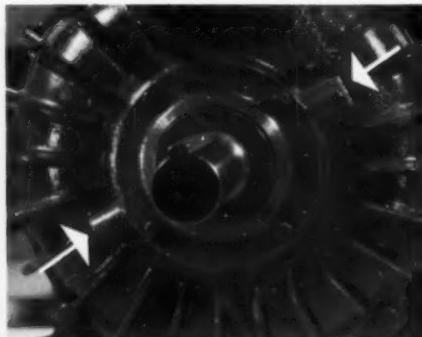
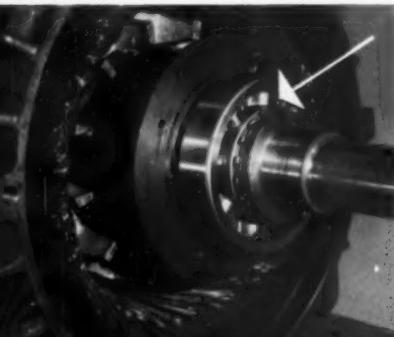
The ball bearings used in these motors are of the highest quality, with more than ample capacity to provide long troublefree service under heavy loads.

BEARINGS CAN BE RELUBRICATED

Factory lubrication will last for many years under normal service, but openings are provided to permit relubrication that adds years to motor life under severe conditions.

SEALS KEEP BEARINGS CLEAN

Both ends of these motors have running shaft seals to keep the bearings clean. Bearing housings are effectively sealed to prevent escape of grease.



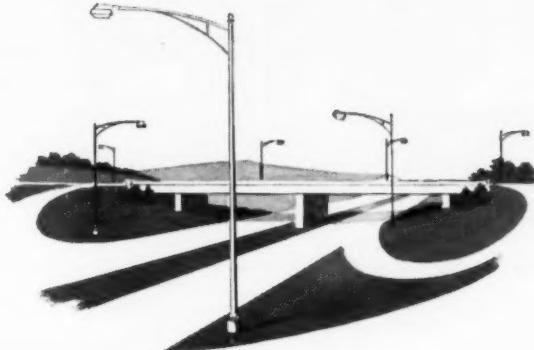
for street lighting • highway lighting • floodlighting

UNION METAL MONOTUBE POLES



Monotube street lighting poles . . . steel or aluminum . . . round or fluted . . . davit or bracket styling . . . anchor or transformer base. Attractive in any location. Continuous-tapered Monotube poles are available in a broad range of designs and sizes to meet all requirements.

Monotube highway lighting poles are offered for various mounting heights and strength requirements. Easily wired and installed. Steel Monotubes are made from high grade, open hearth steel and cold-rolled for strength. Aluminum poles are made by the spinning method.



Monotube floodlighting poles . . . for sports, business, industrial or recreational areas. Available in heights from 20 to 100 feet. Monotube designs permit extreme flexibility in arrangement and number of light units per pole. Floodlights can be mounted, positioned and wired while pole is on the ground.

Complete design and specification data is readily available upon request. Write The Union Metal Manufacturing Company, Canton 5, Ohio. In Canada: The Union Metal Manufacturing Company of Canada, Limited, Brampton, Ontario.

UNION METAL
Monotube Lighting Poles



Engineered for Dependability

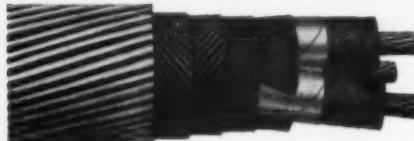
... in Mining and Quarrying



Tirex Shuttle Car Cable

Mining engineers everywhere who insist on first line quality are careful to specify Simplex-TIREX heavy-duty cables. The durability for which TIREX is famous results from curing and conditioning advanced compounds in a lead mold. This process, originated by Simplex in 1920, has never been surpassed.

... in Power and Lighting



Anhydrex Insulated Submarine Cable

Simplex-ANHYDREX and ANHYDREX XX Insulated cables are designed for installation in any environment. They operate dependably in circuits requiring up to 35 Kv; permit conductor temperatures as high as 90°C. wet or dry; and can be supplied with any desired outer covering, round wire armor, C-L-X continuous metal sheath and Simplex Condex interlocked armor.

... in Railroading



Railroad Signal Cable

Railroad men rely heavily on Simplex cable for every wiring application, including Power, Control, Communication, Signal, Diesel Wire, Car Wire, and portables. This is especially true where Signal Cable is concerned. Their sense of responsibility both to the road and to the public demands that they use only the finest.

NEW C-L-X

... in Industrial Construction



C-L-X Sheath with Thermoplastic Cover

Plant Engineers may specify Simplex power, control and communication cables — or combinations of these — on the basis of electrical requirements only. Simplex C-L-X provides completely sealed mechanical protection.

In addition, C-L-X (the metallic duct with built-in cable) gives not only the protection usually provided by rigid ducts or conduits — it gives pliability too. Because C-L-X is a completely closed system, it prevents damage from nearly all liquids and many harsh chemicals.

... in Maintenance



Tirex Welding Cable

The reliability, safety and efficiency of any portable electric tool depends on the integrity of its cord or cable. Simplex-TIREX portable cords and cables are practically indestructible when used to do the work for which they are designed. TIREX portable cables are also cured and conditioned in lead.

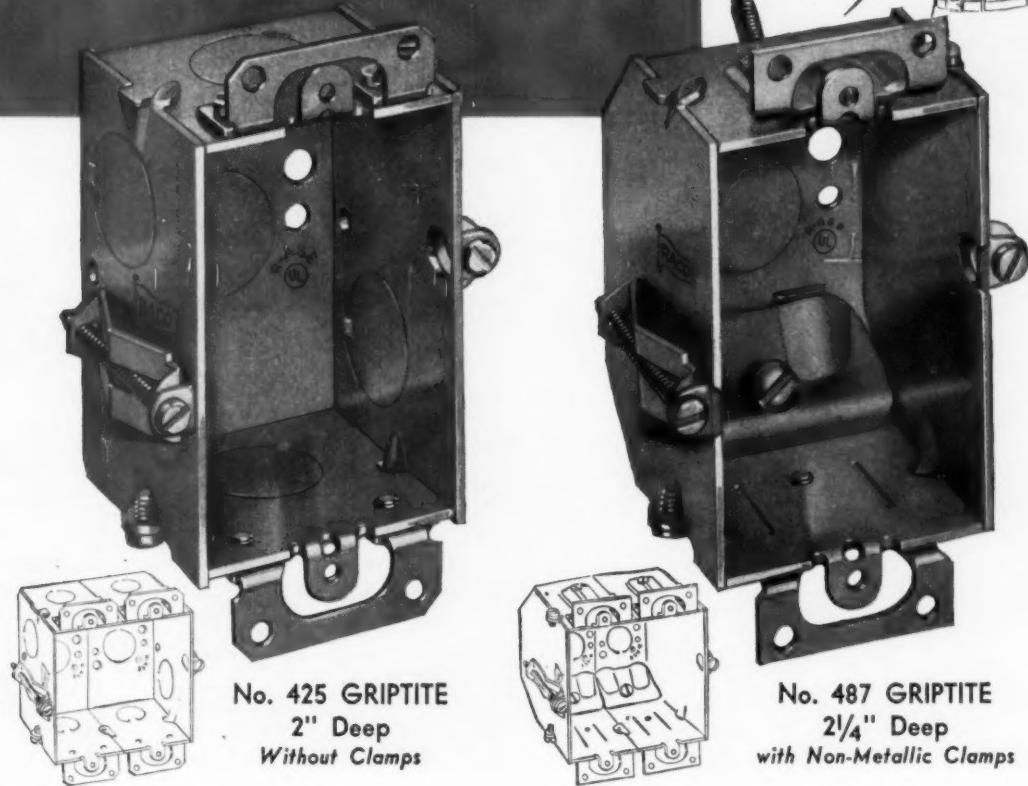
For Specific Product Data Write To—

Simplex WIRE & CABLE CO.
79 SIDNEY STREET, CAMBRIDGE 39, MASS.



Give Your "Old Work" A Profit Lift with

New RACO GANGABLE GRIPITITE BOXES



- GRIPITITES ARE EASIEST TO INSTALL
- WORK PERFECTLY IN ANY TYPE WALL—WOOD, WALLBOARD, PLASTER, CONCRETE, BRICK
- EXPANSION-ANCHORS FASTEN BOXES SECURELY
- 2-GANG GRIPITITES IDEAL FOR KITCHEN EXHAUST, CENTRAL AIR CONDITIONING SWITCHES

You Can Always Rely on Raco

You get fast installation with Raco gangable Gripitite boxes. Make old work installations more profitable. Single or ganged, Raco Gripitites anchor securely in any type of wall. Next time make a Raco Gripitite installation and show a profit on old work!



ALL-STEEL EQUIPMENT INC.
AURORA, ILLINOIS



THEY'RE HERE NOW . . . AND ONLY WESTINGHOUSE HAS GOT THEM

**Complete Line of
Quicklag Circuit Breakers**



There's only one circuit breaker design best suited for lighting and power circuits—Quicklag®! And there's only one man who can offer you a full range of these small-size, high-interrupting capacity breakers—your Westinghouse Sales Representative!

These Westinghouse Quicklag circuit breakers are available now in two models—fast-mounting plug-in Quicklag P; and versatile front-connected Quicklag C. Both are available in 1-, 2- and 3-pole construction. Both incorporate all of the design features that have made Westinghouse breakers the standard for industry. For example: De-ion® arc quenchers for fast, safe arc extinguishing; quick-make, quick-break trip-free mechanism that

prevents contact "teasing"; silver-alloy contacts; insulated common-trip bar; cooperative thermal-magnetic trip; all this plus accessories and modifications for additional versatility.

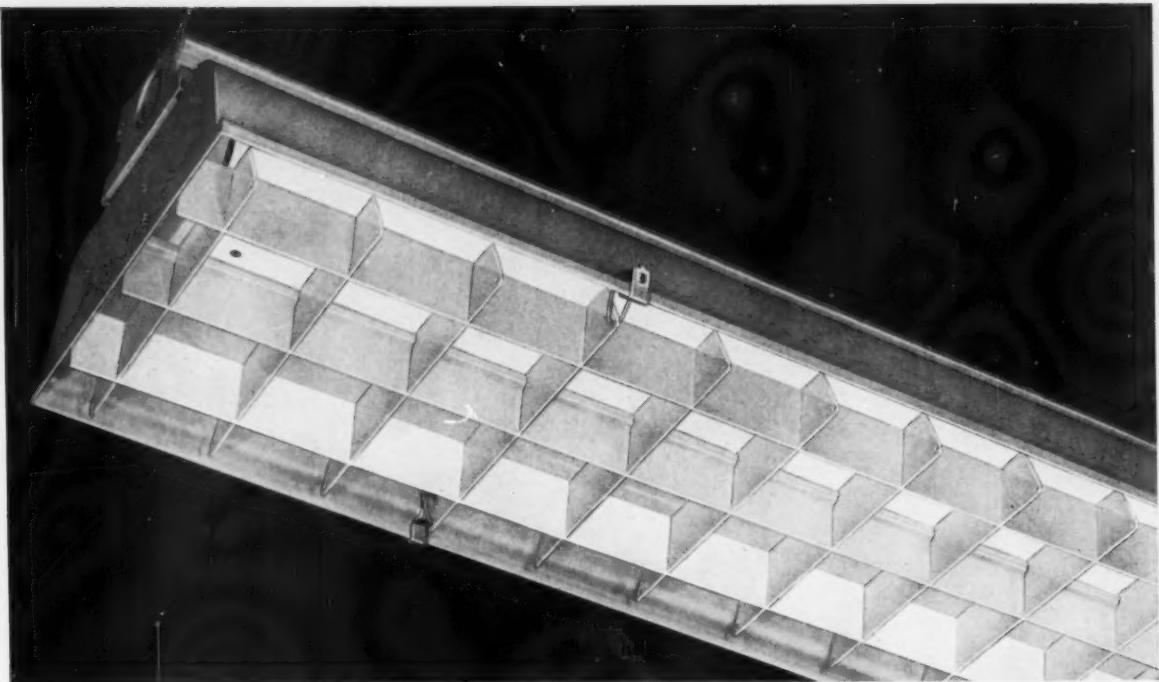
A call to your local Westinghouse Sales Representative will give you the full story on the Westinghouse Quicklag line. Or you may write to: Westinghouse Electric Corporation, Standard Control Division, Beaver, Pennsylvania.

J-30299

YOU CAN BE SURE...IF IT'S
Westinghouse

Westinghouse Electric Corporation
STANDARD CONTROL DIVISION
Beaver, Pennsylvania





Sylvania VHO Special Series (VHO-2V14-RS). Engineered especially for Sylvania VHO lamps. Rugged 4-foot industrial type has porcelainized reflector . . . 19% upward light component . . . green channel and tinted green louvers with 30° x 30° eye shielding. Also in 8-foot length (VHO-2V28-RS).

Sylvania Very High Output Fixtures

...in 7 different styles for best
light control with the new
higher-intensity fluorescent lamps

Sylvania now offers 7 different lines of fixtures to handle the revolutionary Sylvania VHO and other very high intensity fluorescent lamps. Not only in industrial plants, but in offices and commercial applications, you can now take full advantage of the higher footcandle levels and far-reaching economies offered by these great advances in lighting.

With Sylvania fixtures, you can choose from 7 different lines—15 fixtures in all—that use very high output lamps. Each style has its own features, advantages and applications.

Best fixture value in every price range

 **SYLVANIA**

Fluorescent Lighting Fixtures and Systems

LIGHTING • TELEVISION • RADIO • ELECTRONICS • PHOTOGRAPHY • ATOMIC ENERGY • CHEMISTRY-METALLURGY

The higher-level illumination provided makes Sylvania very high output fixtures ideal for high-mounting installation, for low-mounting where higher intensities are called for, or applications where simplification of lighting layout is desired. For a no-obligation demonstration, call in your Sylvania Fixture Specialist. Or write direct to Lighting Headquarters for informative folder V-800.

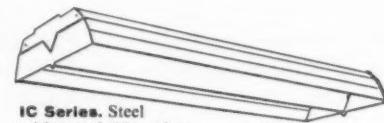
SYLVANIA ELECTRIC PRODUCTS INC.
Department K40
Lighting Division—Fixtures
One 48th Street, Wheeling, W. Va.



Diamond-'I'
Series. For high quality industrial illumination where specs call for 25% upward light component. Has high overall illumination efficiency of 85%, porcelainized reflector, 30° crosswise shielding. Takes all T-12 very high output lamps. Louvers optional. In 4- or 8-foot lengths.

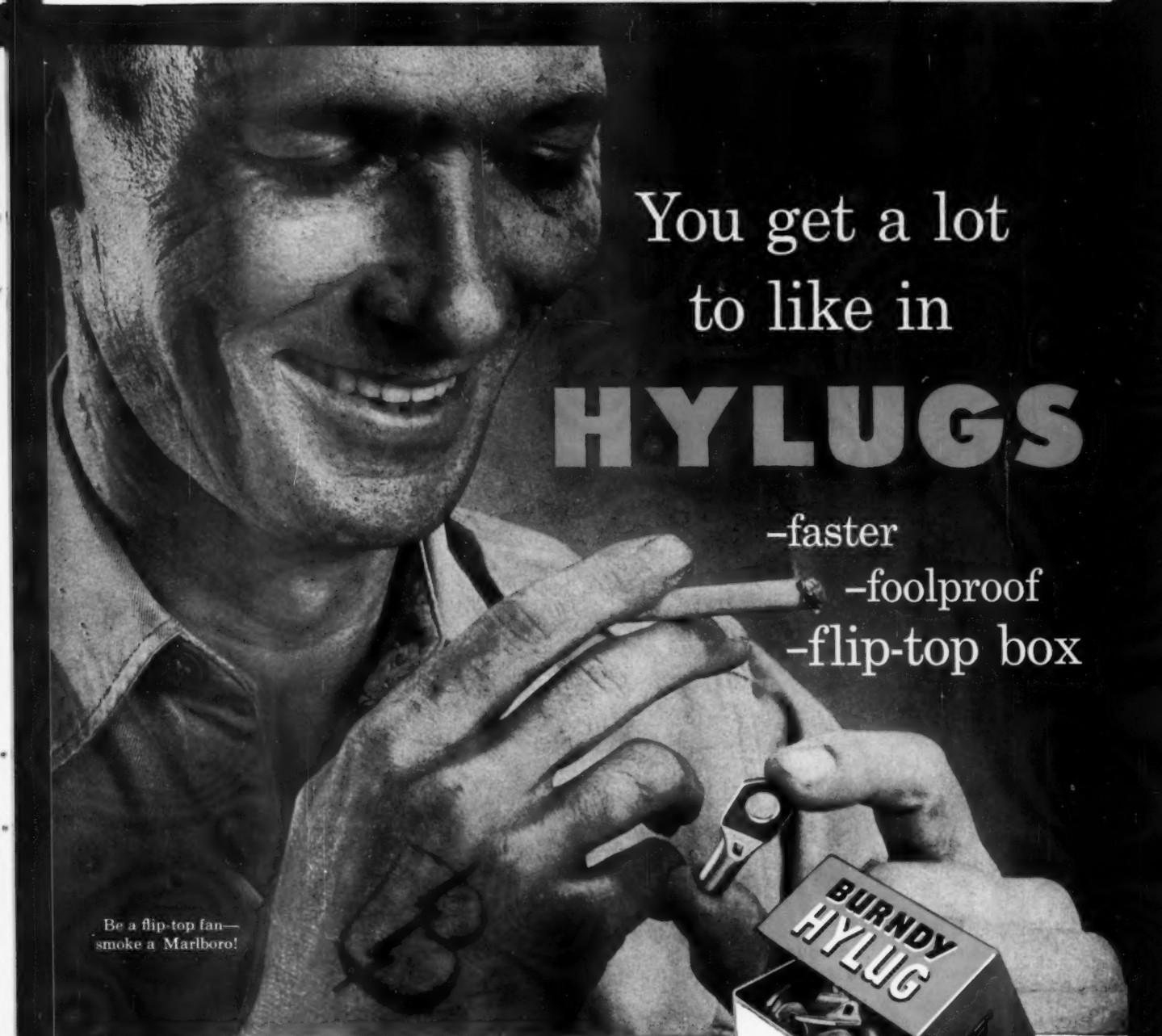


NTWS Series.
Slotted direct industrial type provides 14% upward light. Choice of enamel or porcelain reflector. Takes all types of very high output lamps. Louvers optional. In 4- or 8-foot lengths.



IC Series. Steel with metal sides, gives semi-direct lighting distribution with 30% upward light. Especially suited for high-mounting where maintenance is a problem—also office areas. Takes all very high output lamps. Louvers available. In 4- or 8-foot lengths.

Shown above are but a few of the many Sylvania fixture types now available for very high output fluorescent lamps. For information on others, write to address shown.



You get a lot
to like in

HYLUGS

-faster
-foolproof
-flip-top box

Be a flip-top fan—
smoke a Marlboro!

Yes, there's lots to like in Burndy Hylugs
— now packed in the new foolproof, faster, flip-top box!
Wire, Hylug and stud sizes clearly marked on
every box. Separate color-coded boxes for Hylugs
and Hylinks. No more fussing, fumbling in your kit!
Flick out the Hylug flip-top box, flip open the
cover — make fast, dependable Burndy Hydent
connections — indent on any side of barrel —
controlled by the easy-to-use Burndy Hytool. Available
in the flip-top box thru No. 8. In sturdy corrugated
boxes up to 2000 MCM. Buy them today!



BURNDY

NORWALK, CONNECT. • SCARBORO, CANADA



A Day-Brite job throughout . . . CONSUMERS POWER CO., Lansing, Mich. KENNETH C. BLACK, Architect; E. ROGER HEWITT, Mechanical and Electrical Engineer; LANSING ELECTRIC MOTORS, Electrical Contractors.

The tough lighting jobs go to DAY-BRITE

Lighting the new Lansing home of Consumers Power Co. might have been complicated by the wide variety of *area* and *ceiling* functions.

Achieving the desired quality and quantity of illumination required by area function was no problem. 26 different kinds of Day-Brite fixtures were specified to meet every lighting need.

Mechanical planning and fixture installation were

simplified, too, because Day-Brite equipment is designed for smooth integration with standard ceiling assemblies. Day-Brite *pioneered* and *introduced* today's widely accepted Ceiling Indexing System.

Most good architects, engineers and contractors think of Day-Brite *first* when lighting problems arise. Next time we can be of service to you, call your Day-Brite representative listed in the Yellow Pages.

DAY-BRITE . . . the Engineer's Choice



SEE US IN DALLAS

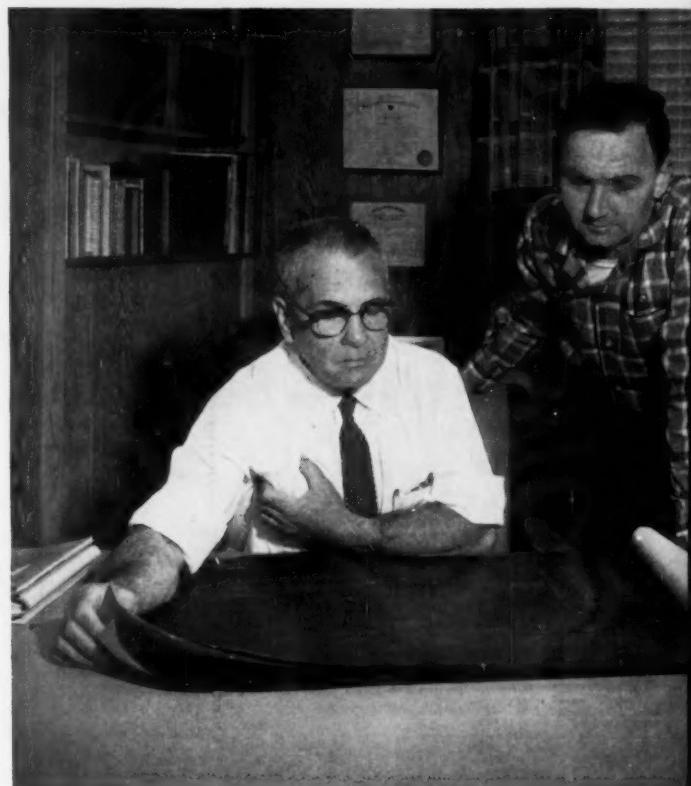
NECA Convention,
Nov. 18-20

Visit the
Day-Brite Booths,
Nos. 123 and 124



Day-Brite Lighting, Inc.
6248 N. Broadway, St. Louis 15, Mo.
Day-Brite Lighting, Inc. of Calif.
530 Martin Ave., Santa Clara, Calif.

Z-440 © Day-Brite Lighting, Inc. 1958



Consulting Engineer E. ROGER HEWITT (left) and
WILLIAM TROMBLEY, Electrical Designer

How important is service?

Here's what Day-Brite service means to Roger Hewitt:

"Our fixture specifications are based upon a continuing analysis of all lighting fixtures. Design features, durability, assembly and installation procedures are carefully evaluated. Our specification requirements are rigid, but Day-Brite equipment never fails to meet them . . . and the price is right."

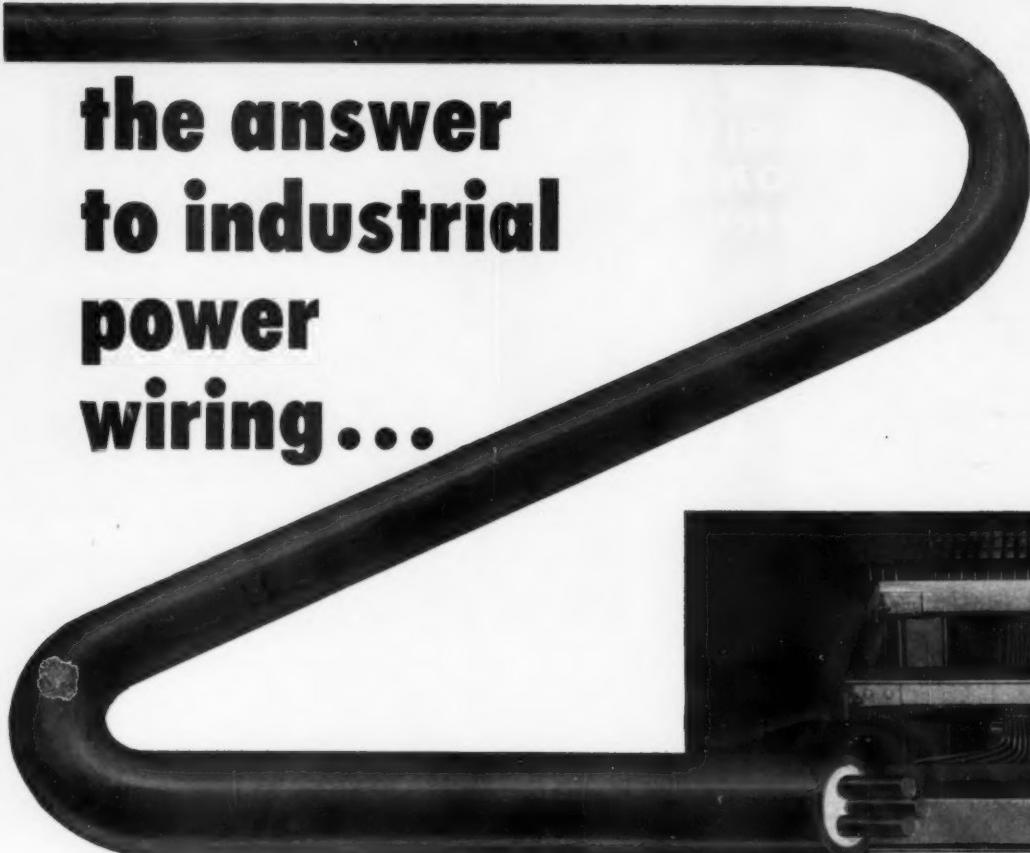
"As important as any of these requirements, however, is the service provided by the manufacturer. Here, too, Day-Brite is outstanding. On the Consumers Power Co. project, for example, a Day-Brite engineer came up to consult with us on the job, and was extremely helpful."

"I speak from experience when I say that the services performed by Day-Brite personnel—both at the factory and in the field—leave no cause for complaint."

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

SAFETY m.i. CABLE

**the answer
to industrial
power
wiring ...**



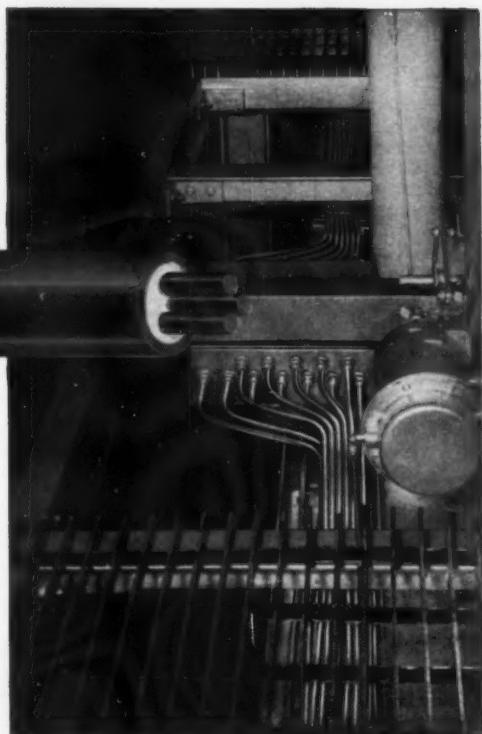
- SPACE SAVING
- INSTALLED EASILY
- Time saving
- Fast power wiring
- Permanent
- to cut down-time

More and more General Cable's Safety MI 600 Volt Wiring System is being used because it can take the abuse of industrial application, giving trouble-free operation and unexcelled performance under the most severe conditions. Particularly adaptable in hot and wet locations. Available in 1, 2, 3, 4 and 7 conductor for power and control circuits.

Ask for a Demonstration To-Day!

GENERAL CABLE CORPORATION, 420 Lexington Avenue, New York 17, N.Y.
Offices and Distributing Centers Coast-to-Coast

for quality and service...specify GENERAL CABLE



MI terminating in main Japan Oven control center switchboard
at Poinsett Lumber and Manufacturing Company, Anderson, S.C.



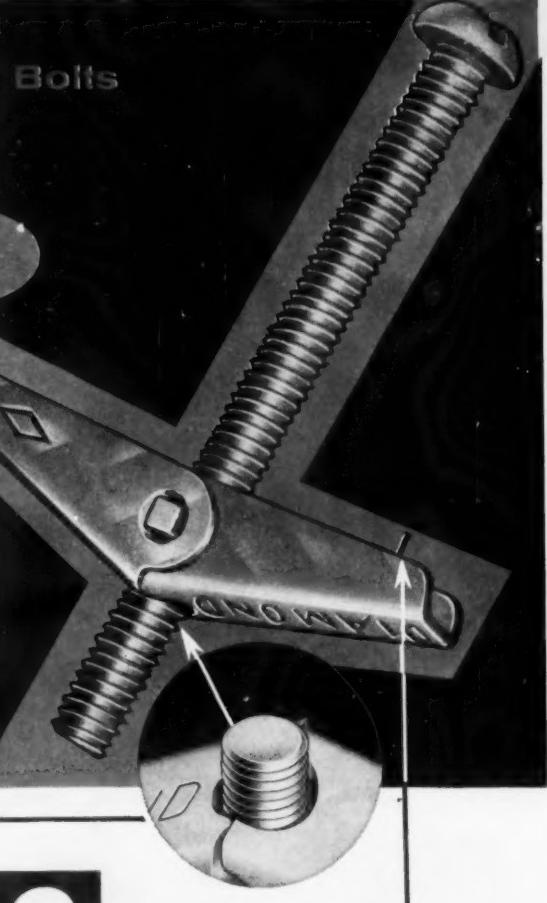
DIAMOND Spring Toggle Bolts

THESE **TWO** EXCLUSIVE DIAMOND FEATURES

guarantee faster work,
greater holding power

1

Patented Feature — Wings butt together forming a truss rather than bearing against the bolt and permit easy tightening even under load.



2

Wings hold at set angle. A special anti-turning prong on one wing allows you to position wings at any horizontal or vertical angle and prevents wings from turning with bolt during installation. Saves time, tempers.

Other DIAMOND Quality Features

- ◆ bright zinc plating, corrosion and rust resistant.
- ◆ entire length of bolt is threaded for use on thick or thin walls.
- ◆ choice of bolt heads; round, flat and, in popular sizes, mushroom.
- ◆ wide range of diameters, $\frac{1}{8}$ " to $\frac{1}{2}$ ", lengths up to 6".
- ◆ packed in strong metal edge boxes, 50 to box all sizes except $\frac{3}{8}$ " and $\frac{1}{2}$ " which are packed 25 to box.
- ◆ other lengths and different heads available on special order.

Diamond Spring Toggle Bolts assure maximum strength, easiest installation. With Diamond Toggle Bolts — you're sure it's secure!

Order Diamond Spring Toggle Bolts from your electrical supply distributor. He offers complete stocks, fast service.



Complete information and specification on Diamond Spring Toggle Bolts is contained in illustrated Bulletin No. 7001. Write today for your free copy.

DIAMOND EXPANSION BOLT CO., INC.
500 North Avenue • Garwood, New Jersey

Stocking Warehouses: Atlanta, Boston, Chicago, Dallas, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Seattle, St. Louis, Washington, D.C. Also, Montreal, Toronto and Vancouver, Canada.

©1958

Stab-lok® gives you more...

with the



*Symbol
of the Bold New Look
of Leadership*



FULLEST SELECTION OF BREAKERS—
Now you can use Stab-lok's economy to secure commercial and industrial jobs with 3-pole breakers up to 70 amp. and two pole breakers up to 100 amp. Naturally, for lighting circuits, use the space-saving type NC breaker and "millions-tested" type NA.

BOLD NEW LOOK LEADERSHIP

Constant Progress Without Obsolescence

NEW BREAKER DESIGN

NEW ENCLOSURE DESIGN

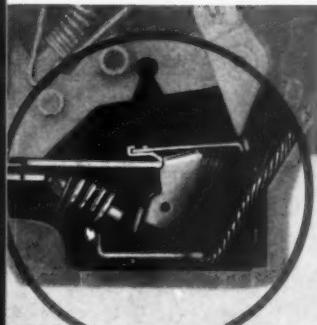
NEW COST-SAVING ENCLOSURES

NEW COIL MAGNETIC TRIP

NEW SEQUENCE BUSSING

NEW STAB-LOK

DISTRIBUTION PANELS



SUREST LAMP CORD AND APPLIANCE PROTECTION—New coil magnetic trip provides Stab-lok type NA, 15 and 20 amp. breakers, with fastest magnetic trip available. Operates at 10 times current. Trips in $\frac{1}{2}$ cycle. Stab-lok's cooperative thermal-coil magnetic action gives fullest protection of lamp cords and appliances.



BEST SELECTION OF ENCLOSURES—Whatever your requirements, Stab-lok has enclosures designed to give you "service-free" installations that are easy and profitable to install. "E-slot" bus construction reduces the cost per circuit. Save up to 30% over equivalent competitive devices.

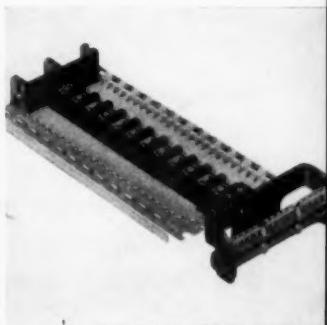
Lower installation costs...better performance...greater eye-appeal—you get all these benefits and more with Stab-lok's "BOLD NEW LOOK OF LEADERSHIP"! Retaining all of the "millions-tested" features that have made it the world's most successful circuit breaker—Stab-lok now brings you important new developments designed to make the entire Stab-lok line better than ever.

And as always—Stab-lok brings you all these advances without the penalty of obsolescence. For with each new improvement or addition to the line—every Stab-lok device, old or new, can be used interchangeably with any Stab-lok breaker or enclosure ever produced.

But this is only part of Stab-lok's "bold new look" story. Get all the facts. Write today: Contractor Service, Federal Pacific Electric Company, 50 Paris Street, Newark 1, N. J.



ECONOMICAL STAB-LOK DISTRIBUTION PANELS—Meet commercial and industrial specifications. Single and 3-phase ...up to 400 A. mains...4-slot bussing to place 100 A. breakers opposite one another...4" gutters...directory...locking provisions...and many custom panelboard construction features.



PLACE TWO-POLE BREAKERS ANYWHERE IN BUSSING—The new sequence bussing in all Stab-lok enclosures makes each device its own wiring diagram...because you secure opposite polarity in adjacent bus slots automatically! When inserting Stab-lok two-pole breakers, you need not refer to any printed instructions.

FEDERAL FPE PACIFIC

Better Products to Distribute and Control Electricity



Real live-wire fleet

Fleet, agile and thrifty . . . Volkswagen Pick-up Trucks. Gas economy, low operating costs, and dependability are outstanding. The bigger your fleet, the more you save. The Pick-up Truck features a 45 sq. ft. floor area, plus a 20 sq. ft. weather-tight, lockable compartment underneath. Sides and tailgate are hinged and drop down for loading at loading platform level. Bows and tarpaulins are optional.

The economy and dependability of Volkswagen performance are backed up by the  service organization. Every mechanic is kept up-to-date through a continuous factory service training program. Speed in servicing is assured by immediate availability of Genuine  Spare Parts through 370 completely-equipped service centers covering all 49 states.

Ask your Volkswagen dealer to show you operating costs for a Pick-up Truck, Panel Delivery, or Kombi Station Wagon. He will prove that Volkswagen savings add up mile by mile and year by year.



VOLKSWAGEN

VOLKSWAGEN DELIVERS THE GOODS...FOR LESS!

...that job calls for

COLUMBIA

FLEX-SEAL

the new **FLEXIBLE**
LIQUID-TIGHT
ELECTRICAL CONDUIT



BETTER!
MOLDED ON VINYL JACKET

(not a sleeve)

- JACKET CANNOT RIDE OR SLIP BACK
- FITTINGS GRIP SECURELY
- VIBRATION PROOF

REDUCES MAINTENANCE
PREVENTS SHUTDOWN
EASY TO WORK WITH



FREE

Write for sample and
specifications brochure.



IT'S LIQUID-TIGHT!

Flex-Seal has been designed specifically to meet the most adverse conditions—in chemical plants, machine shops, printing plants, food plants, breweries—any installation, indoors or outdoors, subject to moisture, coolants, salt air, corrosive fumes, chemicals, greases, abrasives, and other conditions that create hazardous wiring with ordinary conduit.

IT'S SUPER FLEXIBLE!

Because it bends easily to small diameters and because it fits the tightest corners and most irregular shapes, Flex-Seal is ideal for wiring on machine tools, motors, pumps, air conditioning towers, outdoor amusements, conveyors . . . machinery of every type.

IT'S ECONOMICAL!

Because the first cost is the last cost, Flex-Seal means genuine economy. It eliminates maintenance and prevents costly shutdown. Flex-Seal is easy to install too, cuts easily on the job without special tools. And, its machine grey finish stays cleaner-looking longer.

2 TYPES TO MEET EVERY REQUIREMENT

TYPE XL

with bonding strip
Approved by
Underwriters
Laboratories

TYPE EX

Meets J.I.C.
Requirements

Sizes: $\frac{3}{8}$ " through 2" Color: Machine Grey Sizes: $\frac{3}{8}$ " through 1 $\frac{1}{4}$ "
For installation with standard liquid-tight electrical fittings

COLUMBIA CABLE & ELECTRIC CORP.

Serving the Electrical Wholesaler Since 1912

255 CHESTNUT STREET

BROOKLYN 8, N.Y.



E.M.T.



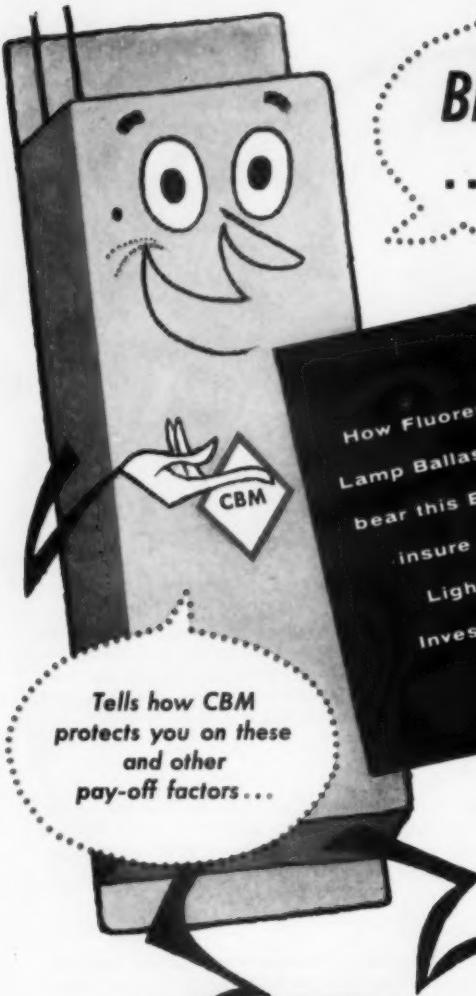
UF



Flexible Steel Conduit



A.C.T.



BEFORE YOU BUY LIGHTING ...get this free booklet!

How Fluorescent
Lamp Ballasts that
bear this Emblem
insure your
Lighting
Investment

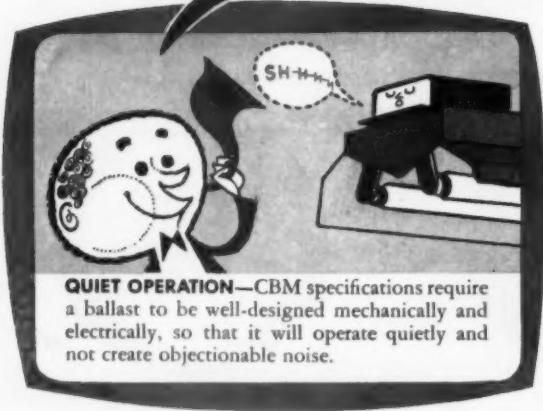
CBM
CERTIFIED
by
ETL

Tells how CBM
protects you on these
and other
pay-off factors...

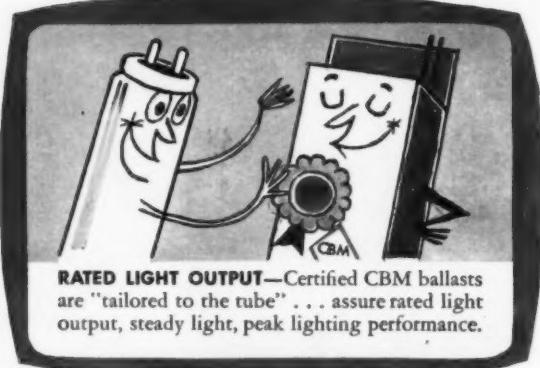
CERTIFIED BALLAST MANUFACTURERS



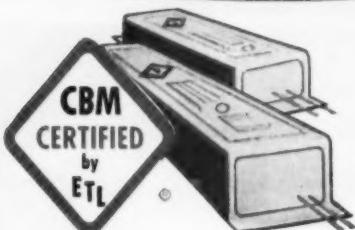
BALLAST LIFE—Certified CBM ballasts are tested for temperature . . . must confine to set limits, as overheating drastically cuts ballast life.



QUIET OPERATION—CBM specifications require a ballast to be well-designed mechanically and electrically, so that it will operate quietly and not create objectionable noise.



RATED LIGHT OUTPUT—Certified CBM ballasts are "tailored to the tube" . . . assure rated light output, steady light, peak lighting performance.



Send for this free booklet and learn how these factors and
11 others help insure your lighting investment when
you buy fixtures equipped with Certified CBM ballasts.

Eight leading manufacturers now make up the association of

CERTIFIED BALLAST MANUFACTURERS

2116 KEITH BUILDING • CLEVELAND 15, OHIO

Participation in CBM is open to any manufacturer who wishes to qualify

CBM-6-58



Make
Bull Dog
your Pet Tape!



There's a
BULL DOG TAPE
 for every purpose

- **FRICITION**
- **RUBBER**
- **PLASTIC**

BULL DOG TAPE is a man's best friend! Delivers thoroughbred performance every time. It goes on fast . . . sticks tight and stays tight. Splices neatly . . . extra strong and non-ravelling. High dielectric strength for complete all-around electrical protection. **BULL DOG** is tough, too . . . resists weather and moisture . . . stands up longer on the job!

Sold only through verified wholesalers

Another quality product of

BOSTON

BOSTON WOVEN HOSE & RUBBER COMPANY
 BOSTON 3, MASSACHUSETTS

Also manufacturers of Garden Hose • Nozzles • Matting • Stair Treads



NOW... a complete line

GROUNDING ONLY Twist-Lock®

for 15 AMP., 277 volt fluorescent lighting applications

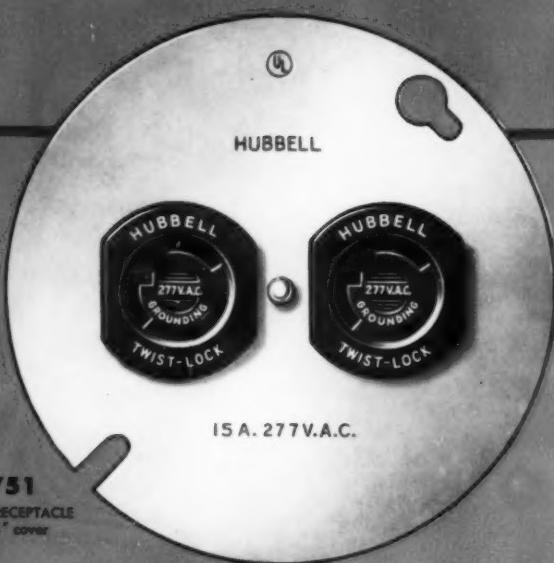


NON-INTERCHANGEABLE
WITH REGULAR "TWIST LOCK",
4700 LINE (15 amp., 125 volt) "TWIST-LOCK"
OR ANY OTHER DEVICES
ON THE MARKET

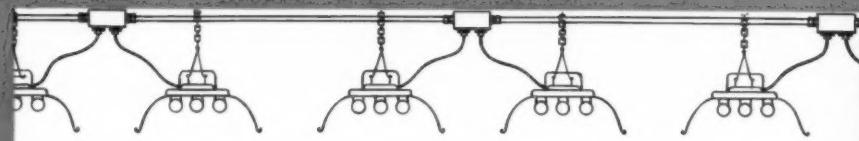
AND INTRODUCING...

THE ONLY 277 VOLT,
DUPLEX LOCKING AND
GROUNDING RECEPTACLE ON
THE MARKET... OFFERING
TREMENDOUS SAVINGS IN
FIXTURE INSTALLATION TIME
AND MONEY.

4751
DUPLEX RECEPTACLE
with 4" cover



4750 Duplex Receptacle feeds two fixtures from one single gang box... cuts number of devices needed in half... cuts cost of boxes needed in half... saves hours of time on both fixture installation and maintenance.



ANOTHER
EXCLUSIVE

HARVEY HUBBELL, INCORPORATED

Bridgeport 2, Connecticut

IN CANADA: Scarborough, Ontario

HUBBELL NEW DEVICE PAGE

FOR CATALOG 29

GROUNDING ONLY "TWIST-LOCK"



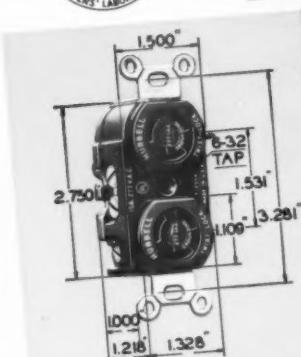
OCTOBER 1958

Designed for **277 volt** circuits
widely used for fluorescent lighting

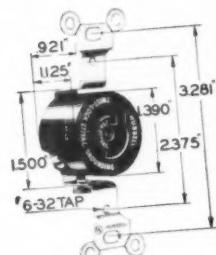
An entirely new line of caps and
receptacles providing positive
grounding plus "Twist-Lock" Protection

Non-interchangeable with regular "Twist-Lock", 4700 line ground-
ing (15A.-125V.) "Twist-Lock", or any other device on the market.

3-WIRE, 15 AMPERES-277 VOLTS ONLY



4750 DUPLEX RECEPTACLE
Duplex receptacles are
both side and back wired



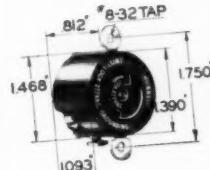
4760
SINGLE RECEPTACLE



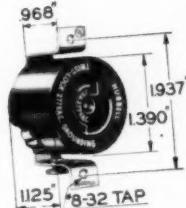
4751
DUPLEX RECEPTACLE
with 4" cover



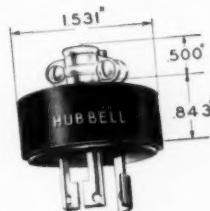
4761
SINGLE RECEPTACLE
with 4" cover



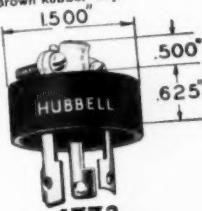
4763
SINGLE RECEPTACLE
with 1 3/4" strap



4762
SINGLE RECEPTACLE
with 1 1/16" strap



4770
Brown Rubber Cap
1.500"



4773
Brown Bakelite Cap
1.531"



4776
Armored Cap

Cat. No.	Description	Cat. No.	Description
4750	Duplex Outlet, brown bakelite, side and back wired	4762	Single Receptacle with 1 3/4" strap, brown bakelite
4751	Duplex Outlet with 4" cover, side and back wired	4763	Single Receptacle with 1 3/4" strap, brown bakelite
4752	Duplex Outlet, brown bakelite, side wired only, 2 feeds and 1 return	4770	Brown Rubber Cap with cord grips (.296 to .562)
4753	Duplex Outlet, brown bakelite, side wired only, 2 feeds and 2 returns	4771	Brown Rubber Cap with cord grips (.406 to .625)
4760	Single Receptacle, brown bakelite	4773	Brown Bakelite Cap with cord grips (.296 to .562)
4761	Single Receptacle on 4" cover	4774	Brown Bakelite Cap with cord grips (.406 to .625)
		4776	Armored Cap with cord grips (.296 to .562)
		4777	Armored Cap with cord grips (.406 to .625)

HARVEY HUBBELL, INC., BRIDGEPORT, CONNECTICUT
PAGE 126-K

Printed in U.S.A.



NOW... a complete line

GROUNDING ONLY Twist-Lock®

for
15 AMP., 277 volt fluorescent lighting applications

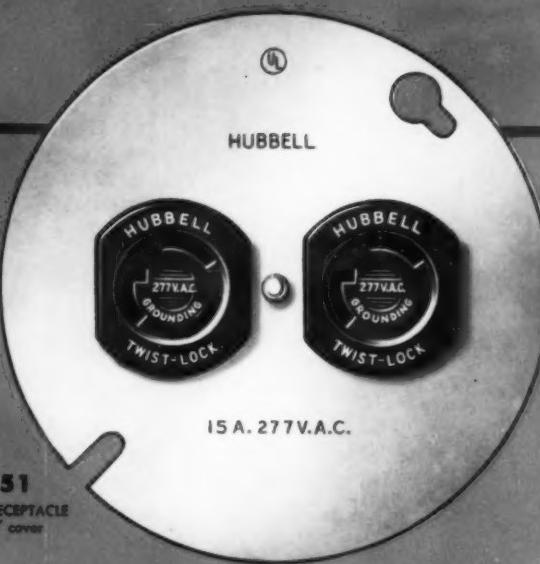


NON-INTERCHANGEABLE
WITH REGULAR "TWIST LOCK",
4700 LINE (15 amp., 125 volt) "TWIST-LOCK"
OR ANY OTHER DEVICES
ON THE MARKET

AND INTRODUCING...

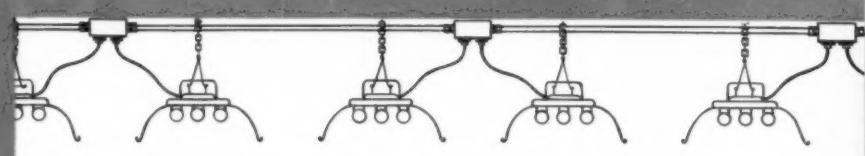
THE ONLY 277 VOLT
DUPLEX LOCKING AND
GROUNDING RECEPTACLE ON
THE MARKET... OFFERING
TREMENDOUS SAVINGS IN
FIXTURE INSTALLATION TIME
AND MONEY.

4751
DUPLEX RECEPTACLE
with 4" cover



4750 Duplex Receptacle feeds two fixtures from one single gang box... cuts number of devices needed in half... cuts cost of boxes needed in half... saves hours of time on both fixture installation and maintenance.

ANOTHER
EXCLUSIVE



HARVEY HUBBELL, INCORPORATED

Bridgeport 2, Connecticut

IN CANADA: Scarborough, Ontario

HUBBELL NEW DEVICE PAGE

FOR CATALOG 29

GROUNDING ONLY "TWIST-LOCK"



OCTOBER 1958

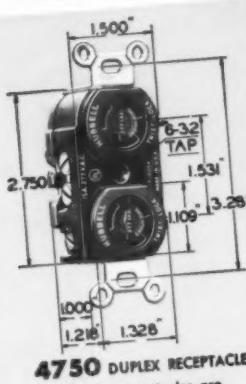
Designed for **277 volt** circuits
widely used for fluorescent lighting

An entirely new line of caps and
receptacles providing positive
grounding plus "Twist-Lock" Protection

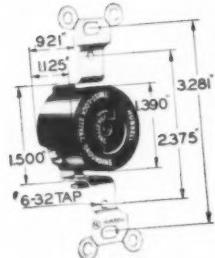
Non-interchangeable with regular "Twist-Lock", 4700 line ground-
ing (15A-.125V.) "Twist-Lock", or any other device on the market.



3-WIRE, 15 AMPERES-277 VOLTS ONLY



4750 DUPLEX RECEPTACLE
Duplex receptacles are
both side and back wired



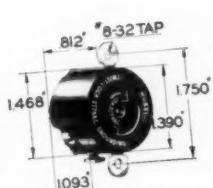
4760
SINGLE RECEPTACLE



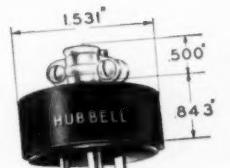
4751
DUPLEX RECEPTACLE
with 4" cover



4761
SINGLE RECEPTACLE
with 4" cover



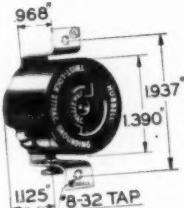
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HARVEY HUBBELL, INC., BRIDGEPORT, CONNECTICUT
PAGE 126-K

Printed in U.S.A.



In Conventional Dress or "Sack"...

*Milady Appears to Best Advantage Under **LITECONTROL** Lighting*

What's the "price tag" on quality lighting like that above? Very reasonable because the installation features standard Litecontrol fixtures.

The luminous ceiling uses Holophane No. 6024 acrylic lenses which provide approximately 100 foot-candles of extremely comfortable and flattering illumination — with shadows reduced to a minimum. (The round downlights were supplied by others.) The moderate cost of the lens ceiling is further reduced and offset by the fact that the fixture occupies a considerable area which would otherwise require new ceiling material. The owners and store personnel are enthusiastic about the lighting and rightfully proud of their smart-looking premises.

Right now there are architects and contractors making other property owners enthusiastic with Litecontrol illumination on a sensible budget. *Be one of them — it pays!*

INSTALLATION: George H. Kimball, Inc., Portsmouth, N. H.

TYPE OF AREA: Ladies' Apparel Store

STORE DESIGNER: Hermsdorf Fixture Mfg. Co., Manchester, N. H.

DISTRIBUTOR: Dyer-Clark Co., Lawrence, Mass.

ELECTRICAL CONTRACTOR: Walter B. Redden, Portsmouth, N. H.

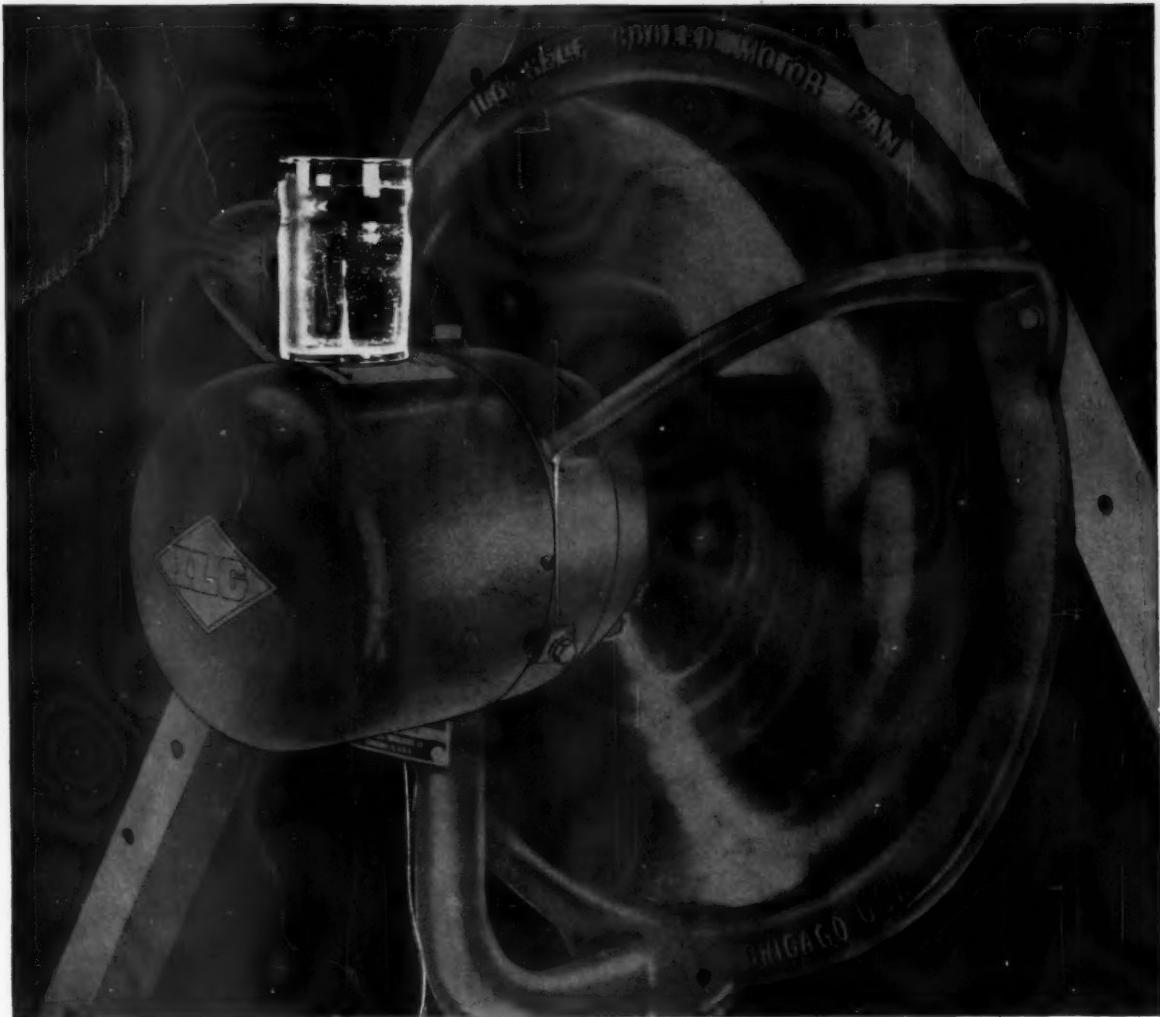
FIXTURES:

Litecontrol luminous lens ceiling, 8' x 48', using Holophane 6024 lenses
— lamps on 24" centers

INTENSITY: Average 100 foot-candles in service


LITECONTROL
Fixtures
KEEP UPKEEP DOWN
LITECONTROL CORPORATION.
36 Pleasant Street, Watertown 72, Massachusetts

DESIGNERS, ENGINEERS AND MANUFACTURERS OF FLUORESCENT LIGHTING EQUIPMENT DISTRIBUTED ONLY THROUGH ACCREDITED WHOLESALERS



not a ripple at 1140 revolutions

with  self-cooled propeller fans

You Can See for Yourself how vibration-free a fan can be. All you need is a glass of water—and an *Ilg Self-Cooled Propeller Fan*. Put them together . . . turn on the power . . . and there's your proof!

Ilg-built direct drive motors and Ilg dynamically balanced fan wheels cut noise as well as vibration to the absolute minimum . . . practically eliminate maintenance, too. For Ilg self-cooled, permanently lubricated motors never run "hot," have no wearing parts.

Power Costs are down—as much as 10%—since Ilg self-cooled motors offer the operating cost advantages of open-type motors plus the protection of totally enclosed motors.

And when you "install Ilg," you get the "One Name-Plate" pledge of performance that Ilg fans will exhaust *more air more quietly for more years*.

Catalog No. 153 tells why. Why not send for your copy?



ILG ELECTRIC VENTILATING CO.

2879 N. Pulaski Road, Chicago 41, Ill.

Offices in 57 Principal Cities

NEW

ORANGEBURG® CA* CONDUIT



*Orangeburg Standard Conduit with Flush Coupling
Attached at Factory...No Extra Cost!

JOINS 26% FASTER

Because there are no separate couplings to assemble on the job, Orangeburg's new CA Conduit lays faster—costs less to install. In addition, there are no coupling cartons to handle, transport or store.

Orangeburg's new CA Conduit comes, at *no extra cost*, with a factory-attached coupling at one end and a standard 2° male taper at the other end. To join—CA's long, lightweight lengths are placed end to end—hammered home in a simple, one-step operation. Actual installations prove Orangeburg's new CA Conduit joins up to 26% faster!

What's more, because the attached coupling is *flush* with the

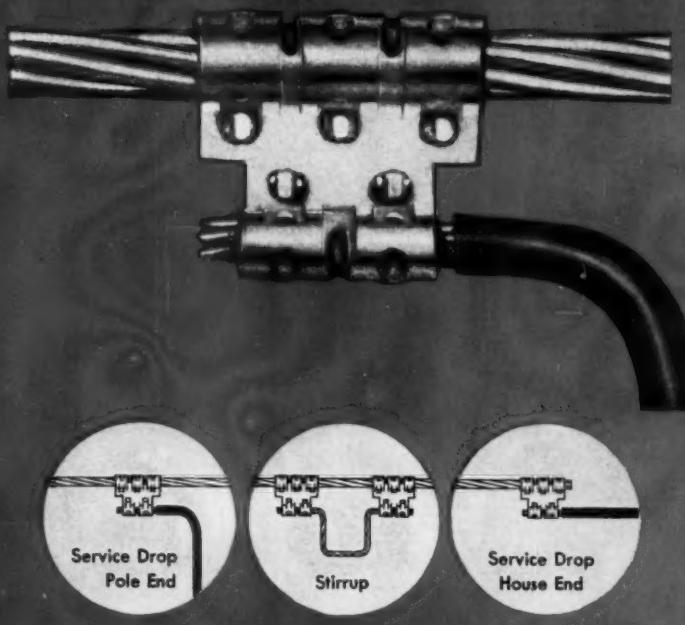
outside diameter of the conduit, new CA Conduit is easy to handle and store in neat, even stacks. And with the new flush coupling there's no need to "stagger" conduit joints in the trench. That means less cutting and tooling time.

New CA Conduit—like the millions of feet of Orangeburg Fibre Conduit in use since 1893—has self-sealing joints and impermeable walls that make it absolutely watertight. Its smooth 100% fibre raceway adds years to cable life.

Specify new CA Conduit on your next job. This addition to Orangeburg's line is available in 2", 3", 4", 4½" and 5" sizes. Orangeburg's Standard and Nocrete Conduit with separate sleeve couplings are available as always. Orangeburg Manufacturing Co., Inc., Orangeburg, N. Y. and Newark, Calif.

Orangeburg Fibre Conduit is distributed by Graybar Electric Co. and General Electric Supply Co. with branches and stocks in principal cities.

The TAP that TOPS them all... .



THE MULTI-PURPOSE **A-MP UTILI-TAP®** for aluminum and/or copper conductors

Tired of all the expensive clutter in your stock rooms—a special tool for this, a special piece of hardware for that? Now you can clear out a lot of your inventory clutter with all new A-MP UTILI-TAP®.

Here is a product that can be used on diverse tapping installations—like no other product on the market. It's permanent, it's sure and it will do many, many jobs.

Your stock can be simplified and easily maintained. Your linemen can now go up the pole without pockets filled with miscellaneous parts or belts loaded with special tools. Simplify with the A-MP UTILI-TAP®.



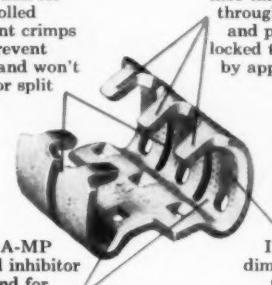
Light-weight matched tooling available in mechanical or hydraulic types.

The only tap on the market that converts from an easily attached open barrel construction to a permanent, closed barrel attachment.

Look at these unbeatable features:

Exclusive split barrel construction for controlled independent crimps that prevent distortion and won't loosen or split

Exclusive locking tabs that are crimped through barrel slots and permanently locked to barrel body by application tool



Special A-MP plating and inhibitor compound for long-life corrosion resistance

Inner barrel dimple serrations to increase tensile strength

Full range of wire size combinations for aluminum, copper or ACSR conductors.

Send today for more information to solve your tap inventory and reliability problems simultaneously.

American Pamcor, Inc.

GENERAL OFFICES: 181 HILLCREST AVE., HAVERTOWN, PA.
Exclusive Distributor For **A-MP** Products To The Utility Industry

For cable ways along the highways...



Along today's modern highways easy-to-handle J-M Transite Ducts provide installation economies and years of service life, protecting traffic-signal, lighting, and other power-service circuits.

J-M Transite® Ducts install fast to last... give complete cable protection.

Because speed and economy set the pace in today's highway programs, more and more highway cables are going into Johns-Manville Transite Ducts.

For speed, Johns-Manville Transite Ducts are strong, light and long—easy to handle and install. Workmen set 10-foot lengths in place easily, join them up tight in seconds with snug-fitting J-M Plastic Couplings, and Transite's smooth bore is free of burrs and other obstructions that may interfere or cause damage during pulling of cables.

For economy, J-M asbestos-cement

Transite Ducts go in to stay. Non-conductive Transite is not affected by electrolysis—resists the corrosive action of fills or high-salt soils in permanently damp locations. Millions of feet of installed Transite Ducts have proved that Transite withstands earth loads and soil stress...resists vibration and shock from highway traffic.

Let us send you free Transite Duct brochure EL-29A. Write Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.



Johns-Manville Asbestos Transite Ducts can be laid directly in trench without concrete envelope or other mechanical protection.

JOHNS-MANVILLE Transite Ducts

Made of Asbestos-Cement

J-M Conduit for direct buried banks and exposed runs
J-M Korduct® for concrete banks

insist on wafer-thin

SHALLORAMA®

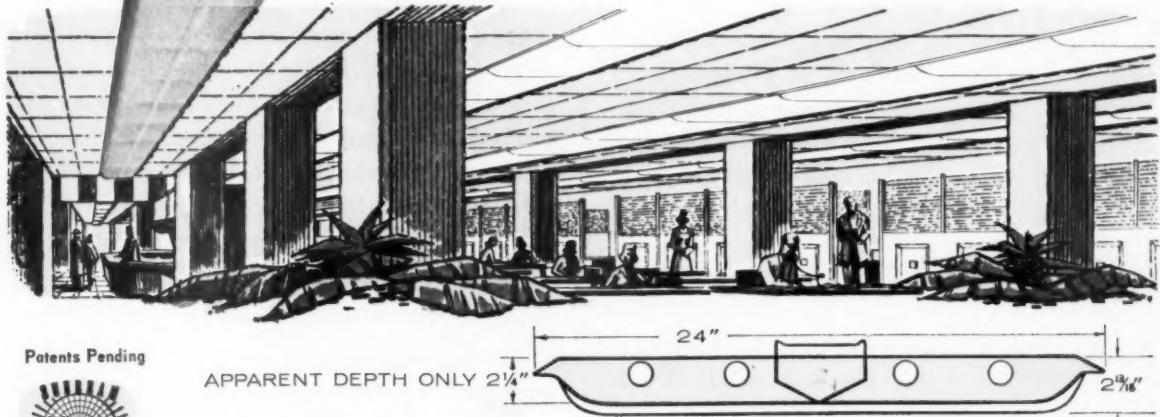
for modern, custom-styled lighting



IT LOOKS
RECESSED

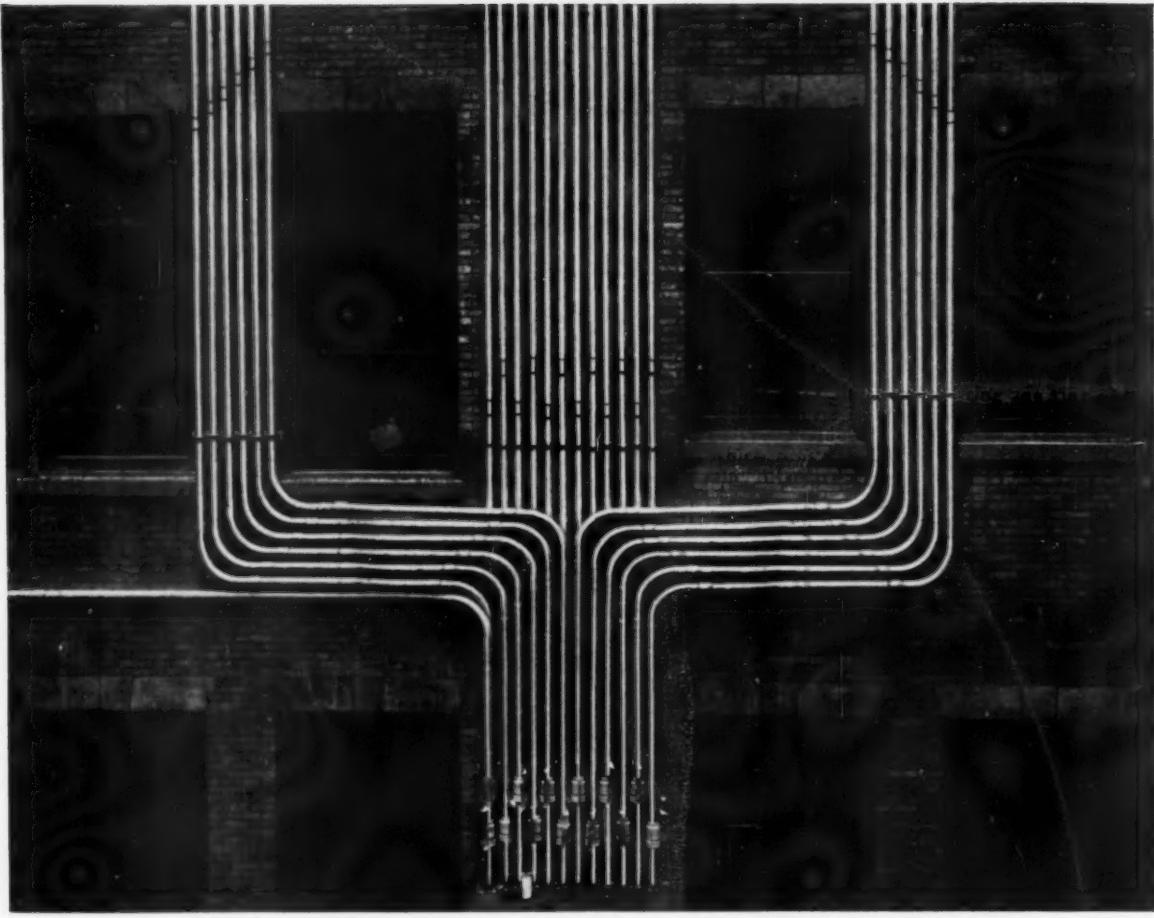
Smartly styled, incomparably shallow, sturdily constructed, the SHALLORAMA® brings a new dimension to architecturally designed lighting. Surface mounted, these fully enclosed, self-luminous Visionaires® look recessed. They are amazingly simple to install and have wide application in both new and remodeled interiors. Handsome, translucent white, high-stressed formed Plexiglas diffusers open by hand from either side on concealed "hook-on" ledges. The plastic diffusers are guaranteed for long life and freedom from discoloration. Unique leveling jacks compensate for uneven ceilings and assure precision alignment. Normal maintenance accomplished without use of tools. For the finest general lighting with wide distribution and even brightness characteristics insist on SHALLORAMA.®

Write for bulletin #A-91



New peaks of engineered performance is exemplified by SHALLORAMA's soft, uniform diffusion of light and efficient ballast heat dissipation.

Sunbeam Lighting Company, 777 East 14th Pl., Los Angeles 21, California & Gary, Indiana



Why Alcoa Aluminum Rigid Conduit Proved to Be the Best Buy for an Ebasco Remodelling Job

In planning to expand the electrical capacity of a 26-story New York office building, the budget dictated that existing external shutter brackets be used for conduit supports. It was doubtful that they would support the weight of steel conduit. The only alternative was a more expensive breaking through of walls and floors inside the building.

The solution proved to be Alcoa® Aluminum Electrical Rigid Conduit. Twenty-four 2½-in. risers were installed on the exterior of the building from painter's scaffolds. The light weight of aluminum conduit made the job easier and faster and reduced labor costs. Further, no maintenance should ever be necessary because aluminum resists corrosion and staining and will never need painting.

For new plants and offices, too, new low prices in all sizes can make aluminum your most attractive conduit buy. Alcoa Rigid Conduit in sizes up to 6 inches is furnished with color-coded thread protectors to tell conduit size at a glance. For more information, call Alcoa, or contact your Alcoa Conduit Distributor. Aluminum Company of America, 2327-K Alcoa Building, Pittsburgh 19, Pa.

Your Guide to the Best in Aluminum Value



"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

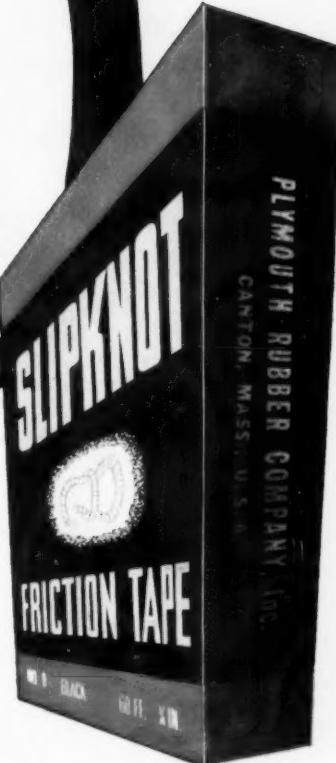


TAPES BY

SOLD ONLY
THRU
RECOGNIZED
DISTRIBUTORS



PLYMOUTH RUBBER COMPANY



It has been our firm conviction for more than 62 years that the electrical industry has saved time and money through recognizing the unique services of the electrical distributor. That is why Plymouth Tapes are sold exclusively through them. Specify SLIPKNOT and PLYMOUTH through your distributor.

PLYMOUTH RUBBER COMPANY, INC.

DIVISION 15

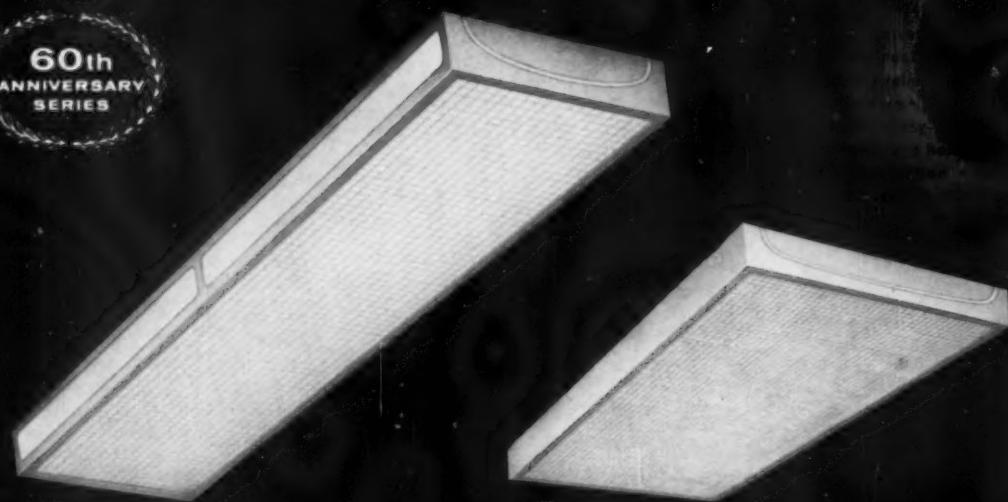
Makers of SLIPKNOT FRICTION TAPE

CANTON, MASSACHUSETTS

PLYMOUTH RUBBER COMPANY, INC.
CANTON, MASS., U.S.A.



60th
ANNIVERSARY
SERIES



New! Surface Mounted Fixtures by GARCY LIGHTING

- 2 or 4 lamp units, only 3½" deep
- Hinged one-piece enclosures
- Regular or translucent sides
- For 48" rapid start lamps

Especially suitable for modern low ceilings, the 60th Anniversary Series embodies simplicity in design, glare-free visual comfort and efficient light utilization. This versatile series offers unique advantages to cost-conscious contractors.

ONLY TWO BASIC PARTS TO INSTALL

1. Compact Chassis
2. One-Piece Enclosure

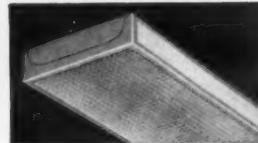


The lightweight chassis is easy to handle. Hinged enclosure is furnished ready for installation . . . no small parts to assemble.

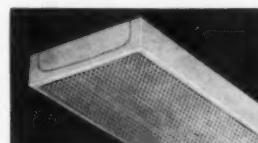
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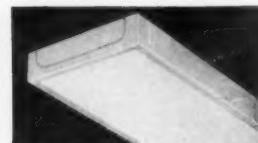
ALBA-LITE GLASS



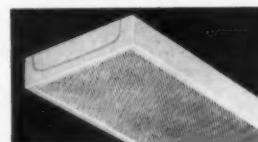
ONE-PIECE PLASTIC LOUVER



EXTRULITE CLEAR PLASTIC



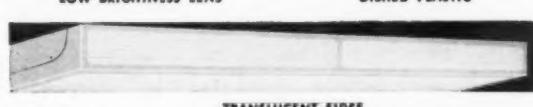
FLAT PLEXIGLAS PANEL



LOW BRIGHTNESS LENS



DISHED PLASTIC



TRANSLUCENT SIDES

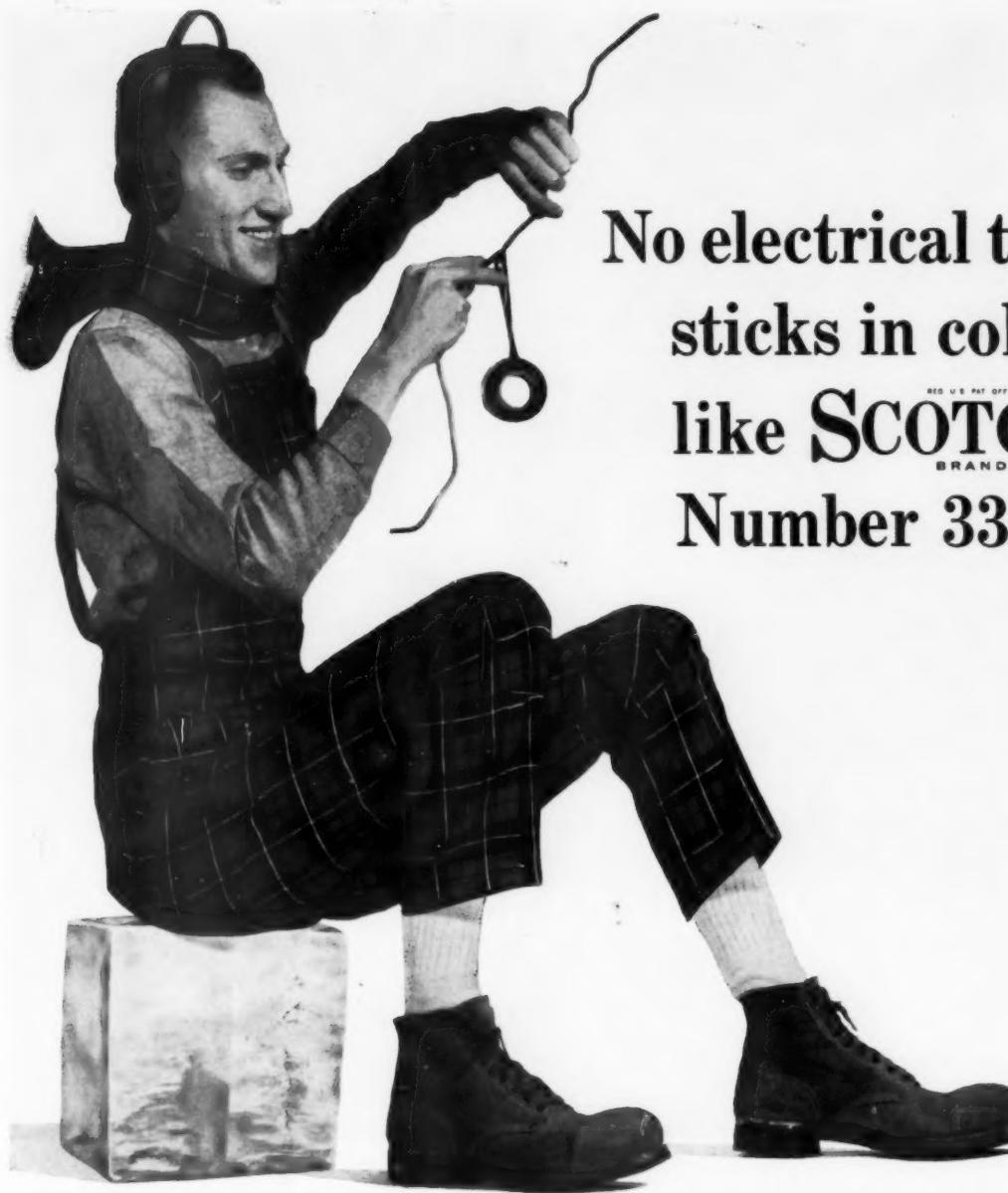


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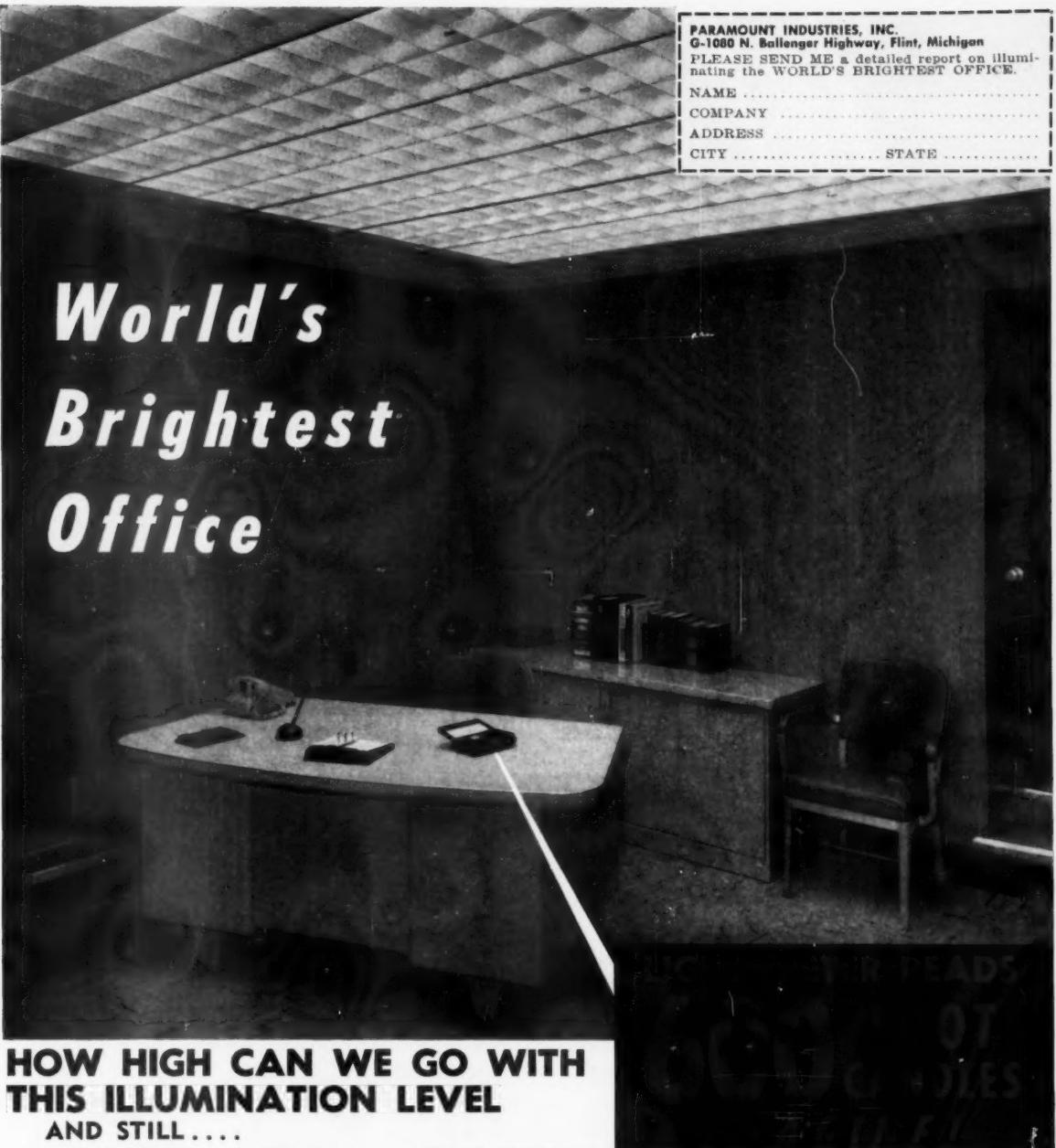
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determined by the fixtures which produce the illumination. Light reflecting surfaces, contrasts, colors, etc., have become such well-known and practised facts that the only avenue left, to reach high levels of illumination with comfort, is through the lighting fixture.

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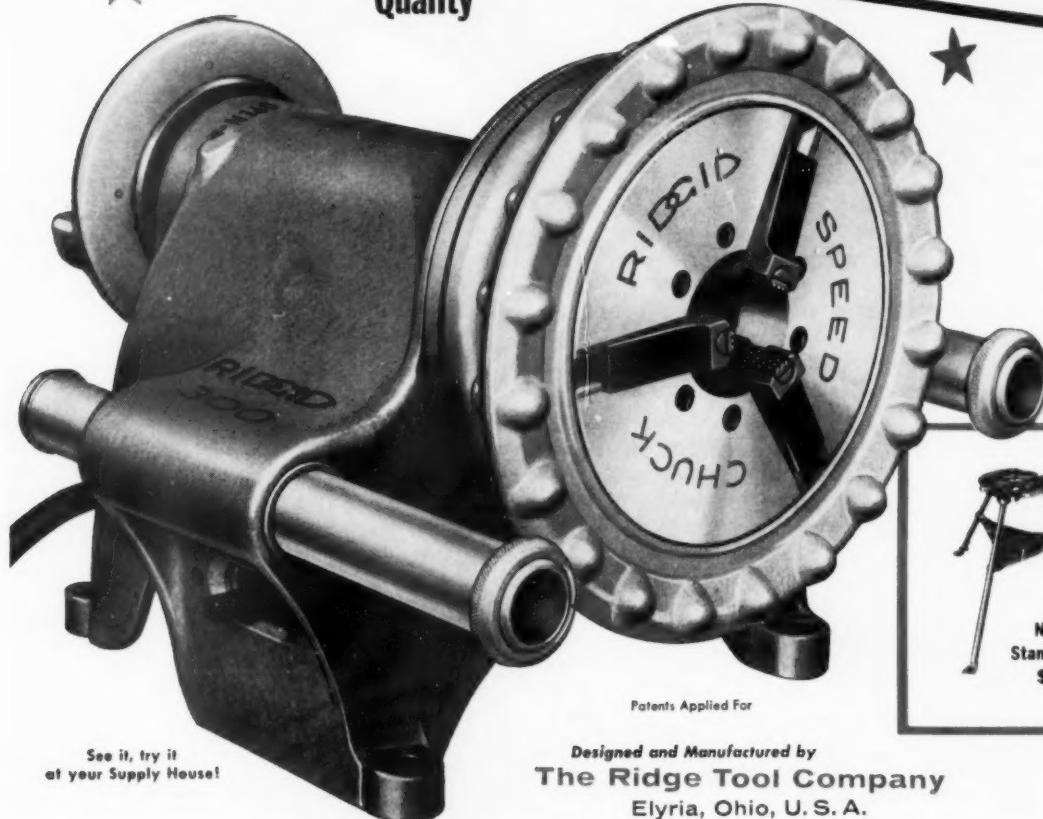
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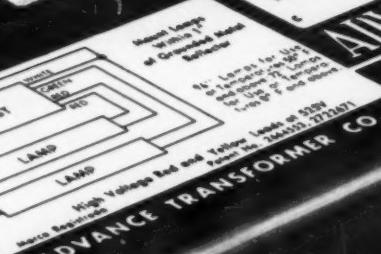
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Street Lighting Modernization

Chicago's famous State Street, one of the world's greatest shopping areas, will be equipped with a spectacular new street lighting system before the end of this year. Seventy specially designed standards will support three fluorescent luminaires high over the roadway with a fourth suspended at a lower level over the sidewalk.

The new system will provide about four times the illumination available from the system it replaces, which was originally installed in 1926. It will extend through the Loop from Lake Street to Van Buren. Each standard will be individually operated by radio control from a central automatic transmitter.

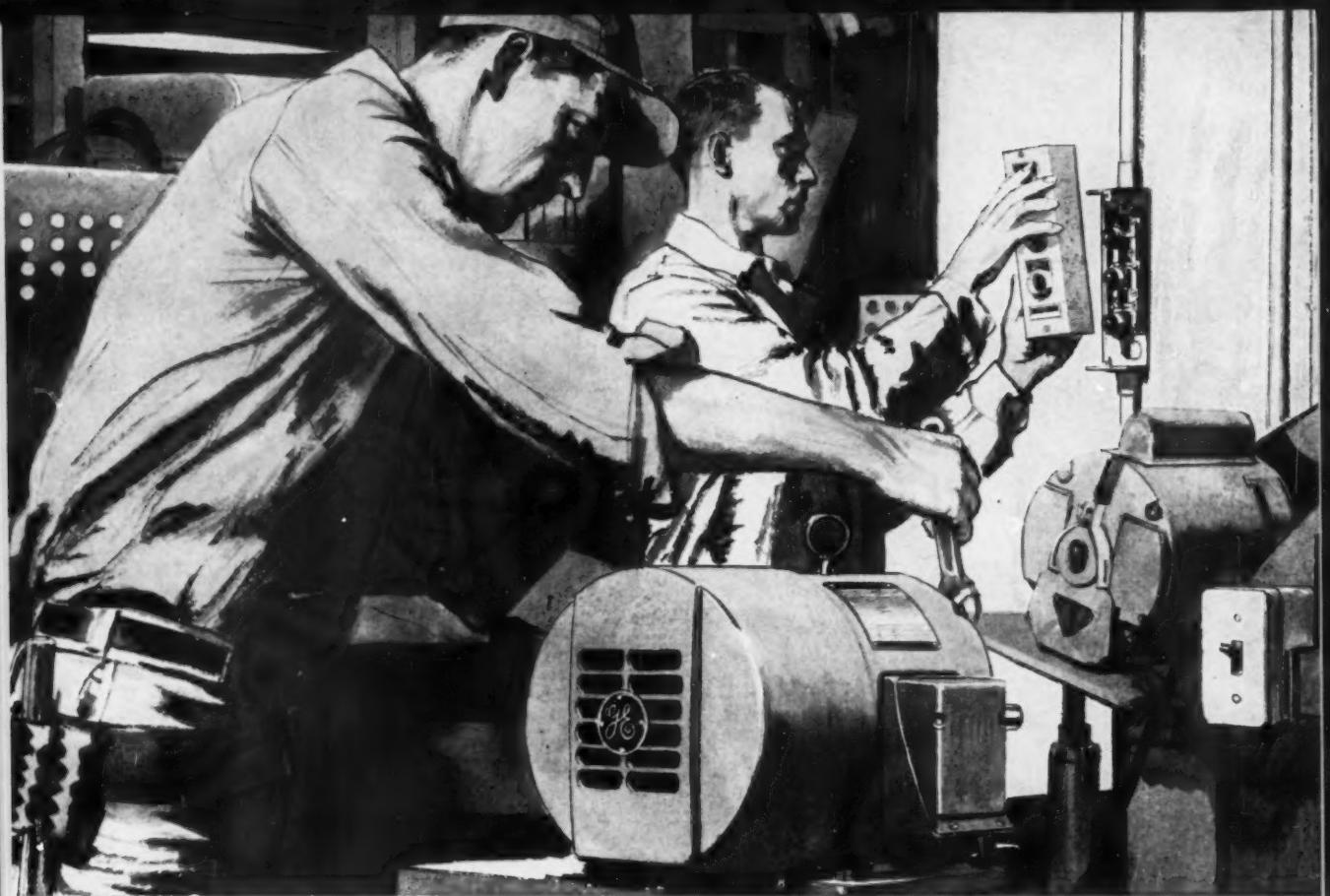
For lighting performance the new installation is expected to surpass anything previously attempted in American street lighting practice. As a conspicuous example of what can be accomplished with bold and imaginative use of modern street lighting equipment, it will certainly encourage the modernization of many more central thoroughfares in other cities.

State Street's lighting modernization is one of the encouraging signs that traditionally conservative and unimaginative street lighting practice is due for a big shake-up. Downtown merchants, who need no instruction on the uses of modern lighting techniques as a means of attracting customers, are becoming increasingly impatient with undistinguished and ineffectual street lighting systems serving prime commercial areas which ought to be the most attractive and brightly lighted in town.

For many of the nation's Main Streets, street lighting modernization is long overdue. Systems designed and installed in past generations have become marks of decadence made conspicuous by comparison with advanced lighting installations springing up around modern new shopping centers in outlying districts and suburbs.

Urban renewal and modernization of our downtown areas are among the most urgent and pressing problems of our time. Rebuilding of street lighting systems to modern standards of appearance and lighting performance can make a major contribution toward preserving the tremendously valuable assets inherent in our long-established community centers.

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Trends in

LIGHTING EQUIPMENT DESIGN

Use these modern lighting equipment design ideas to provide better and more flexible lighting systems for your customers.

By Berlon C. Cooper

MODERN lighting practices reflect rapid and continuing growth. New equipment designs and new application techniques are showing up at an ever accelerating pace. And the continuing growth pace seems destined to continue, in the light of the many current factors which are contributing to this progress.

A major factor that is influencing current lighting growth is, of course, the increasing public acceptance of the need for more light—of higher levels of illumination for all seeing tasks—in the home, in the factory, and in offices, schools, stores, service establishments, and elsewhere. The impact of this factor, the need for even higher lighting levels, is expected

to increase, especially as the results of the recent basic light and vision research of the Illuminating Engineering Research Institute (Blackwell Report) are made known to the public.

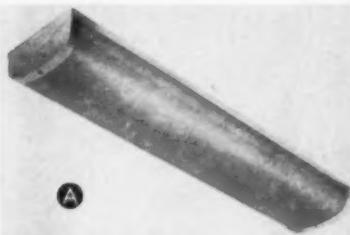
Other factors include a growing acceptance of light as a *design element*, and of lighting equipment as a *design tool*, by architects, consulting engineers, and others; an increasing emphasis on the visual comfort of lighting systems; better integration of lighting systems and structures; a wide variety of light sources, lighting devices and components providing greater flexibility, versatility and control, improved styling, construction, installation, and maintenance features; and many others.

Presented here, for the information and guidance of our readers, is a detailed analysis and roundup of current trends in the necessary lighting tools needed to implement current lighting practice.

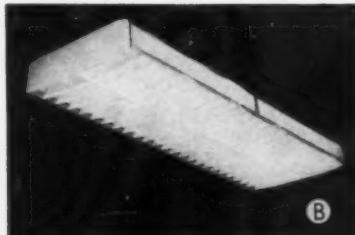
Essentially, this roundup is the lighting industry's own report. It embraces the products and the opinions of all segments of the industry. The illustrations have been supplied by individual manufacturers of light sources, luminaires, lighting equipment, and lighting components. Also, this entire report has been based on their individual comments and opinions. Expanded use of these modern equipments and lighting design techniques will help to insure a better-lighted America.

In-Room Luminaires

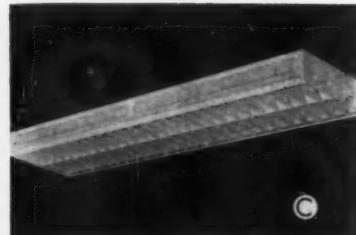
Typical Two-Lamp Fluorescent Luminaires



Plastic Diffuser



Louver Shielding



Louver Shielding

CURRENT lighting practices stem from many of the earlier lighting application techniques. They represent improvements in equipments, in methods of installations, in integration with architectural and structural details, and in appearance. Greater knowledge of the science of seeing, of what constitutes a comfortable visual environment, of the principles of light control, of the need for maximum visual comfort, and of economical ways to produce higher levels of illumination, are some of the other factors which have influenced lighting system designs more recently.

Lighting has become an ever-increasing necessity in the commercial, industrial, recreational and social life of America. It has many benefits to offer. But its intelligent application and use is becoming more and more complex. In order to promote its many benefits and improve the application and use of light, the lighting industry currently has in operation, and planned, several technical and sales training programs. It is expected that these programs will reach most of the designers, specifiers, sellers, and the installers of lighting systems. Against this status of the lighting industry, as it exists today, and of its promotional activities, is seen the need for a supplemental objective roundup and analysis of the lighting tools available, and of the current design trends for these lighting tools—light sources, luminaires, lighting equipment, and components. This roundup and analysis of trends in lighting equipment design has been made, and is

presented here, as a timely solution.

In this report lighting equipment has been classified as to types on an arbitrary basis. In general, the classifications conform to general terminology in use in the industry. One possible exception is the classification of "In-Room Luminaires", discussed on this and the following two pages. This classification is intended to cover all types of luminaires, or units, fixed or portable, which would occupy space within the cubicle area between the walls, ceiling, and floor, except for industrial and residential lighting, which are treated separately in another part of this presentation.

In-room Luminaires

A large percentage of the lighting systems being sold today are still based on the use of in-room luminaires. This is due in part, undoubtedly, to a carry-over of the earlier concepts and practices, or historical precedence. It is also done for reasons of economy, especially in the relighting of older structures, as the installations of in-room equipment is less costly, in general, than that of recessed and built-in types of equipment.

Today's version of modern in-room luminaire designs is vastly different from that of pre-fluorescent lamp days. The linear shape of fluorescent lamps dictated a similar shape for the luminaires. Thus linear luminaire shapes led to the use of lines of light, either surface mounted or suspended. Efforts to provide individuality in lighting equipment layouts, further resulted

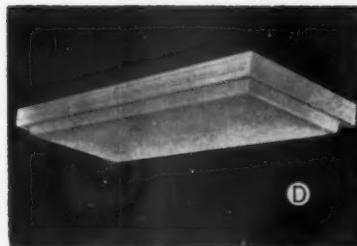
in the use of luminaires to form geometric patterns. Many of the lighting installations in use today in offices, drafting rooms, school classrooms, stores, etc. consist of fluorescent luminaires arranged in continuous parallel rows, or in geometric patterns. Many manufacturers further report that in-room luminaires of these types are still their best sellers, and represent a high percentage of their total dollar sales.

Overall, there is a reported growing trend to built-in types of lighting systems. This is especially noted in new building construction. These trends are discussed separately in other sections of this report. Also, there are definite trends shaping up in in-room luminaires, in both incandescent and fluorescent lamp types.

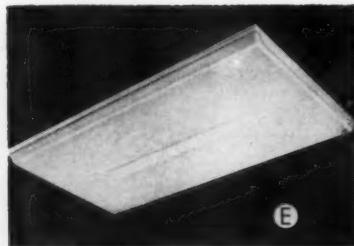
Fluorescent Luminaires

The basic in-room fluorescent luminaire design has been, and still is, the 2-lamp shielded unit. Illustrations A, B, and C show typical designs. These are designed for the standard 4-ft and 8-ft lamps, primarily, and most manufacturers also supply other lengths based on a 2-ft module. These basic designs incorporate a fixture body, which supports the ballast and lampholders, and side and bottom shielding. Side shielding may be by metal, plastic, or glass, and bottom shielding is usually done by plastic diffusers, or by plastic or metal louvers. Thus these 2-lamp units vary in design and construction from all-metal to all-plastic (except for fix-

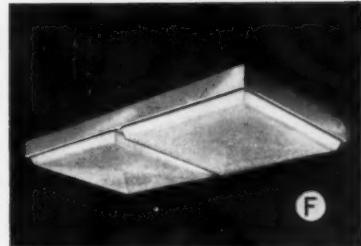
Wide-Shallow Fluorescent Luminaires



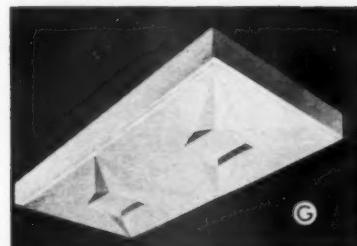
Plain Diffuser



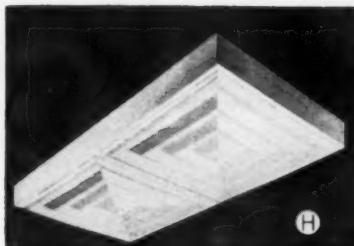
Indented Diffuser



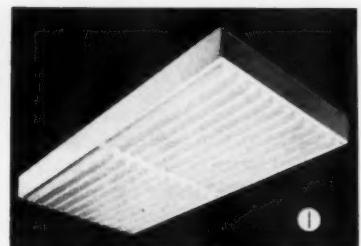
Square Pattern



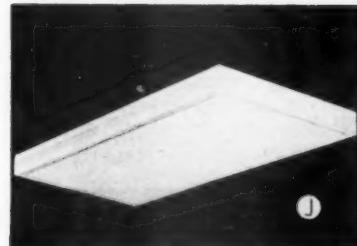
Pyramid Pattern



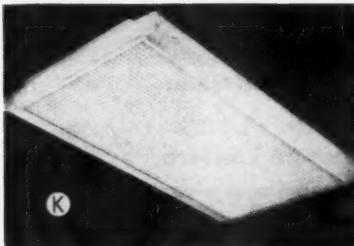
Square Pattern



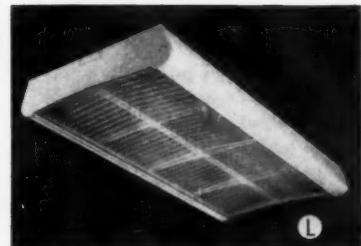
Ridge Pattern



Plastic Louvers



Plastic Louvers



Prismatic Plastic Lens

ture body). The current design trend in these typical 2-lamp luminaires is to improved shielding, and to an expanded use of plastic, for an overall luminous effect. This trend is accomplished in some metal sided designs by providing for reflected light on the exterior metal side shields.

Building construction practices are influencing design trends of fluorescent luminaires. The lighting industry's own objective of im-

proved brightness control is another influencing factor. Architects are reducing ceiling heights, so that ceilings become lower and lower. This practice is forcing the use of ceiling mounted luminaires, or of recessed lighting units. In order to maintain acceptable luminaire brightness, manufacturers are having to provide wider luminaires. Thus, there is a definite trend to wide-shallow units. Nine typical designs are shown in illustrations

D through L. These units are designed primarily for surface mounting on the ceiling, although some of these designs may also be suspension mounted. While suspended in-room luminaires continue to be favored where ceiling heights will permit their use, building construction practice is dictating the use of more and more wide-shallow surface-mounted in room luminaires, or recessed lighting equipment.

There are wide variations in design treatment of these luminaires. They may be made on a 2-ft by 4-ft module, for mounting side-by-side, or end-to-end, to form large area lighting elements. Or, they may be designed with ornamental shaped sides and ends, for individual mounting. Sides may be metal, or plastic. And bottom shielding may be any of a broad range of plastic diffuser materials and designs, metal or plastic louvers, prismatic plastic lenses, or a recently announced (soon to be available)

Wraparound Plastic Diffusers



LIGHTING EQUIPMENT DESIGN

polarized glass fiber diffuser. Some of the more popular pattern design diffusers are shown in the illustrations.

A more recent in-room fluorescent luminaire design trend is to an all-luminous wraparound plastic diffuser type of unit. Typical examples are shown in illustrations M and N. These units provide excellent diffusion and control of light, are easy to maintain, and attractive in appearance.

Another trend, influenced by the expanding use of wide-shallow type units, is to the large-area shallow type of in-room luminaires. These are designed primarily for use as individual large luminous elements, for surface mounting on the ceiling, and is an in-room counterpart of similar recessed luminous elements. These units may also be suspended, when ceiling heights call for it. They are also available with a wide variety of diffuser patterns, plastic lenses and louvers, and metal louvers. Typical designs are shown in illustrations O and P.

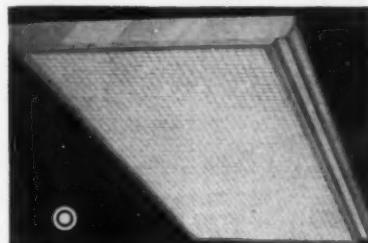
An interesting adaptation of fluorescent lamps to indirect lighting is incorporated in a new luminaire design shown in illustration Q. In this design, the lamp is enclosed in a small-cross-section metal housing, open at top, and equipped with diffuser, plastic or metal louver at bottom, for shielding. These housings may be used singly, or used parallel or in rectangular arrangement. Illustration C on page 81 shows a cross-section detail.

Typical of a wide variety of other types of in-room fluorescent luminaires is a direct-indirect type of wall bracket, as shown in (R).

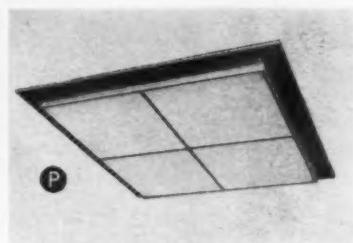
Incandescent Luminaires

While the major trend in in-room luminaires is to fluorescent types, incandescent types still remain popular. For example, bowl-silvered suspended indirect luminaires remain highly popular for lighting school classrooms. Also, lantern type luminaires, and in contemporary design, using incandescent lamps, are still popular for church lighting. Two examples are shown in illustrations S and T. Such lanterns now employ reflector lamps both for indirect and direct lighting. Further, there are new decorative incandescent lamp designs

Large-Area Shallow Luminaires

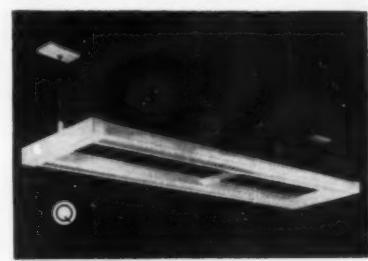


Polystyrene Louvers

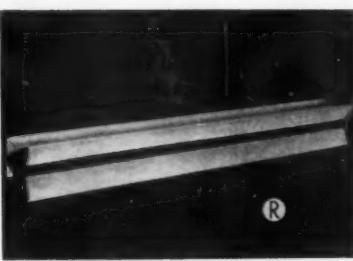


Metal Louvers

Indirect Luminaires

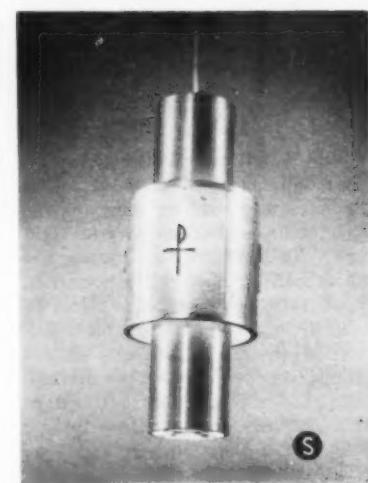


Suspended Semi-Indirect

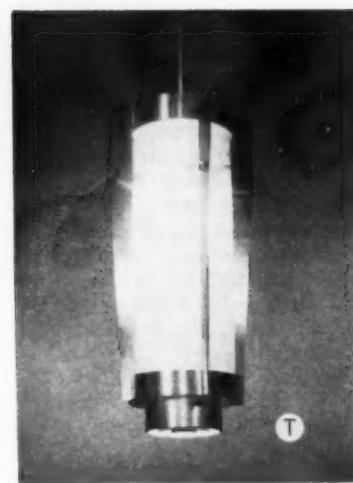


Wall Bracket

Church Lanterns



Cylindrical



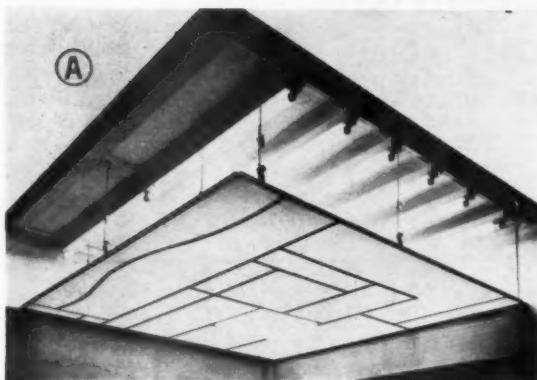
Metal Fins

for lighting restaurants, banquet rooms, lobbies, and public areas in banks and institutional type buildings. Incandescent luminaires in a very wide range of styles, types, and designs represent modern lighting practice for residential lighting, and are preferred by most architects, decorators, and home owners.

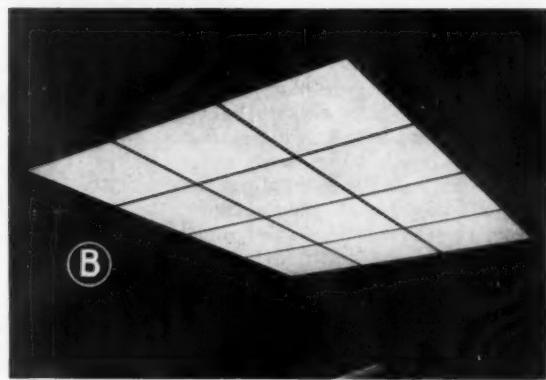
In general, mercury vapor lamps

are not used for interior, or in-room, lighting. It should be noted, however, that color-corrected mercury lamps have been used in the lighting of a few large interior public areas, and have proved to be both economical and attractive. It is possible that a trend may develop in the use of these lamps for interior lighting for these reasons.

Louver Ceilings



Typical Louver Ceiling Construction



Recessed Large Area Louver Panel

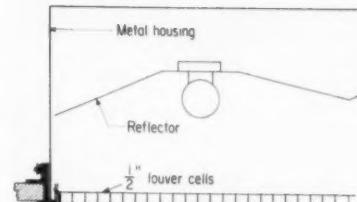
THE principle of lighting with louver ceilings is not new. It was introduced and launched as a lighting application technique more than ten years ago. Thus louver ceiling design trends relate primarily to refinements—in materials, in construction and installation details, in application flexibility and versatility, and in appearance.

The original concept of louver ceiling lighting was to use louvers to form a wall-to-wall suspended ceiling which would be attractive in appearance, transmit light from lamps installed in the cavity above, and shield the lamps from view in the space below. Early installations made use of louvers in various design patterns, of which the cube cell (egg-crate design) was most popular. Cells varied in size generally from 2- by 2- by 2-in. to 12- by 12- by 12-in. As suitable diffusing materials were developed, these gradually replaced louvers. As a result, many believed louver ceiling lighting had been obsoleted. Gradual refinements, however, have brought about a revival, and many

interesting new installations have been made recently.

Currently, there are three basic types, as shown in illustrations A, B and C. Illustration A represents the original construction concept, using entire cavity as a reflecting source. Illustration B shows a self-contained element. In application, these are used as individual large-area elements, recessed flush in the ceiling. Illustration C shows a new concept, aptly described as a suspended floating ceiling.

Louver panels are available in a variety of sizes, in appropriate modular dimensions. Louvers are made of steel, aluminum, and plastic. Cell sizes have been reduced, so that they now vary generally from 2- by 2- by 2-in. to 1- by 1- by 1-in. The use of plastic has made possible wedge-shaped fins, which improves brightness control. Steel and aluminum fins are usually finished white, aluminum, or gray, and a recent trend is to use pastel color finishes in all types. In application, color panels are inserted at random, or in only a few of the modules, as

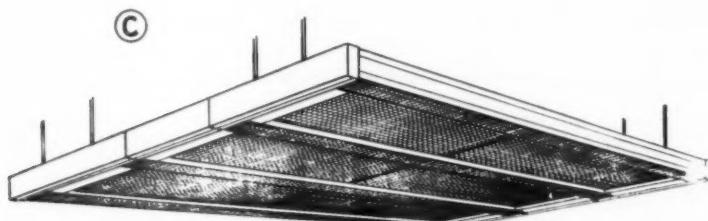


Housing Makes Self-Contained Unit

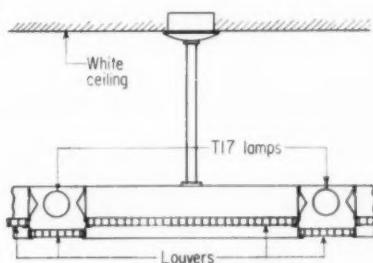
color accents. In the floating ceiling type shown in illustration C, for example, white plastic louvers are used below the fluorescent lamps in the small cross-section housings, and colored plastic panels are laid in the areas between the housings.

Design interest can be obtained by varying the shapes of louver panels, by alternating metal and plastic louver panels, and by changing the cell size in adjacent panels. Smaller cell sizes are generally more acceptable as a design pattern by architects and designers.

Louver ceilings offer unique lighting design possibilities and will continue to be used for many lighting applications.



Louvers Attached to Indirect Luminaire



Louvers Form Ceiling

Diffuser Ceilings

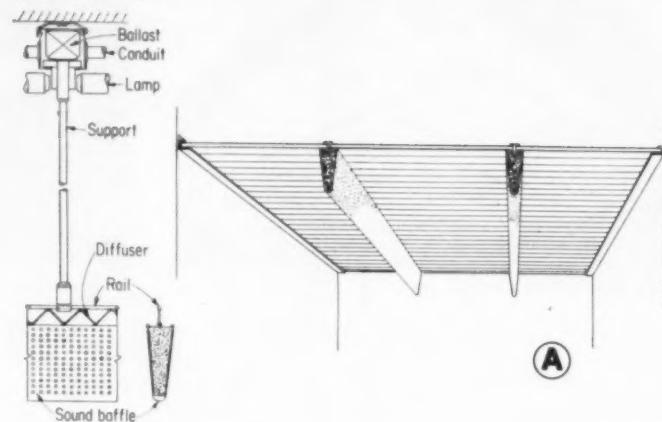
THE principle of diffuser ceiling lighting predates electric lighting. Even before Edison invented the incandescent lamp, skylights were installed in buildings to transmit daylight to the interior. Later, when electric lamps had come into use, these were installed above the skylights to provide electric lighting at night. Today's modern diffuser ceiling lighting systems are, basically, a modern version of the earlier skylight lighting systems. Further, they might be defined as a totally diffuse lighting system (such as a totally indirect lighting system from a diffuse opaque ceiling), achieved by a direct (transmitted direct light through a diffuser) or positive means.

Modern diffuser ceiling lighting is a post War II development. The first practical installations were made about 1950, and its acceptance has been slow but sure since that time. It is considered by many as a refinement on louver ceiling (louverall) lighting, introduced two or three years earlier.

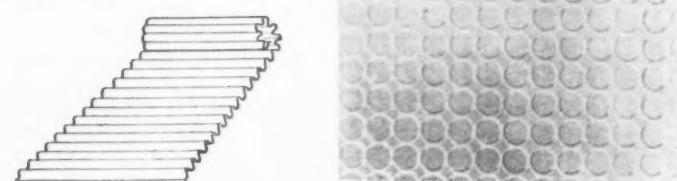
Developments in lighting systems and lighting equipments, in general, have come in response to demands for solutions to new lighting problems and better solutions to old ones, and to the need to serve a more lighting conscious and better informed public. This is especially true in the case of diffuser ceiling lighting. Architectural design trends—glass facades, lower ceilings, clean functional styling, better appearance, comfortable environments—have posed new lighting problems. Diffuser ceiling lighting has helped to meet and solve many of these problems.

Early installations were of the wall-to-wall type of diffuser ceilings. Current trends are to smaller

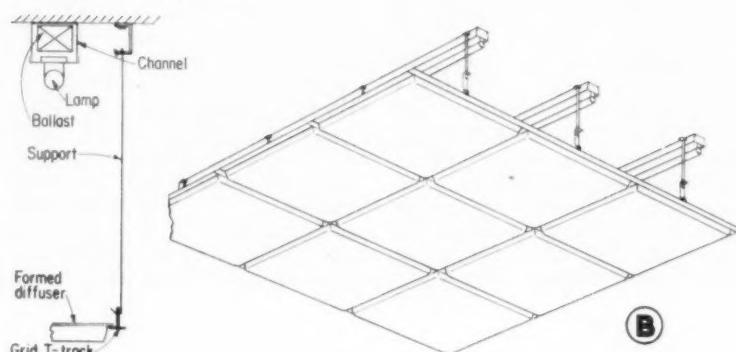
Integral System



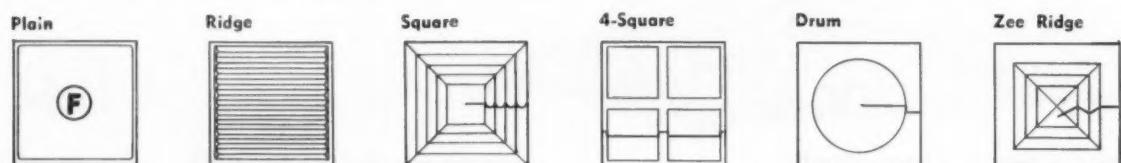
Typical Diffusers



Component System



Typical 2 x 2 Diffuser Panels



large-area luminous elements. Also, several manufacturers have developed a "floating" luminous ceiling, which is easier to install than the original fixed wall-to-wall version.

Diffuser ceiling lighting systems may currently be classified as one of three basic types, or slight variations thereof: 1) integral; 2) component; and 3) self-contained modular.

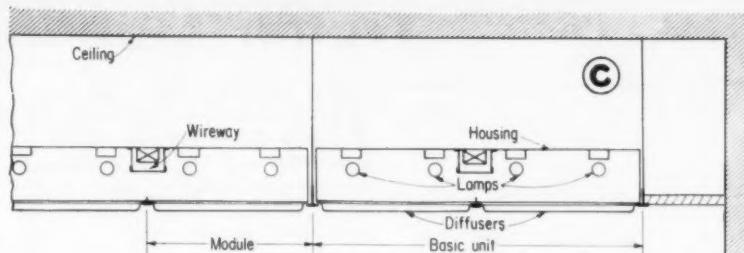
The integral system (A) consists of the electrical wiring system, complete, from which is suspended the diffuser rail tracks and diffuser material. Acoustical baffles may also be attached to the diffuser rail tracks when desired. This system is used primarily for wall-to-wall installation, but may also be adapted for "floating", or for individual large-area elements.

In the component system (B), the electrical wiring system is installed separately in the plenum cavity. The supporting grid framework is then supported from the plenum ceiling, separately from the wiring system. Modular dimension formed diffusers are generally used with this system; however, the diffuser panels of the integral system may also be used.

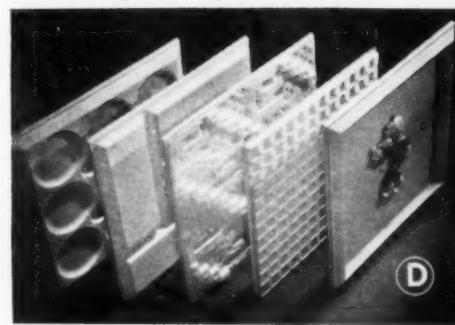
The self-contained modular unit system (C) represents the large-area luminous element version of diffuser ceiling lighting. In this system, modular units (2-ft x 2-ft, 2-ft x 4-ft, 3-ft x 3-ft, 4-ft x 4-ft, etc.) consist of a complete metal housing incorporating wireways, ballasts, lamps, etc., a hinged or fixed face frame, and diffuser panels. These modular units may be installed individually, or side-by-side, to form large-area luminous elements in a variety of sizes and geometric patterns.

Diffuser panels are made principally of plastic—acrylic, vinyl, and styrene. A popular module at this time is the 2-ft x 2-ft size; however, there are several other sizes available (illustration D, E and F). These panels are available in a wide range of pattern designs, and new ones are being announced regularly (also see "Lighting Com-

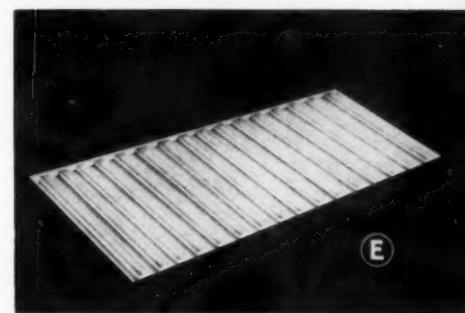
Self-Contained Modular Unit



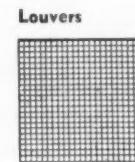
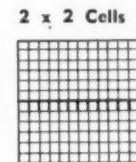
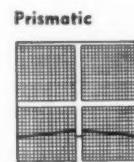
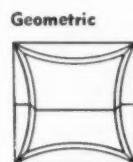
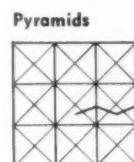
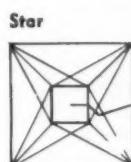
2 x 2 Rigid Vinyl Diffusers



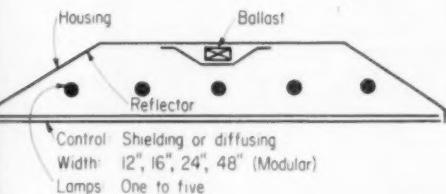
16 x 48-in. Diffusers



unlimited possibilities for custom installations and for individuality with standard equipment and components, with greater flexibility for new and unusual artistic lighting designs.

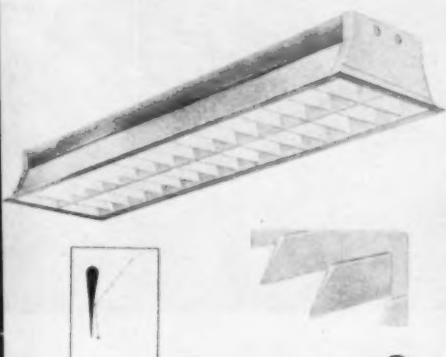


Troffer Lighting



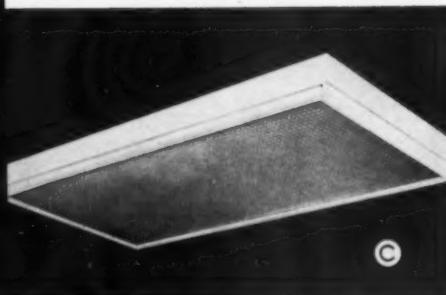
A

Typical Troffer Details



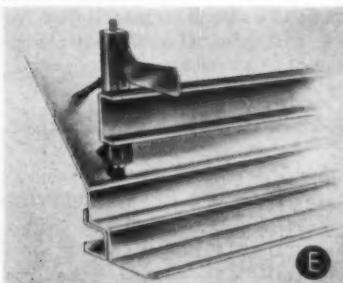
B

Low Brightness Troffer



C

Louver Troffer



E

Concealed Leveling Support

THE lighting troffer was originally developed about 1940, primarily for two reasons. First, it solved the need for a recessed unit for use in low ceilings, which architects were demanding as one means of lowering unit building costs. Second, it provided a practical design for a luminaire for use with the then new fluorescent lamps. A width of 12 ins. was more or less standardized on by the manufacturers, since this was a practical width for maximum economy, efficiency, and good shielding, and also because this width permitted easy integration with earlier installations of acoustical tile. Present troffer designs represent the original principles, with improvements in construction details, methods for installing, cleaning, relamping, etc., and refinements in materials and methods of light control, louvering, and shielding.

Two trends in lighting troffer design are significant at this time. Each is the result of the current demand for maximum lighting quality, and the need for improved brightness control. Use of higher-brightness lamps to provide the higher levels of illumination now being recommended by the Illuminating Engineering Society merely adds urgency to these trends.

The first trend is to wider units (illustration A), and to the use of improved shielding with louvers or diffusers. Construction practices are also demanding that these units be kept as shallow as possible.

The second trend is to low-brightness type troffers (illustration B). Low brightness is achieved by the use of a completely symmetrical parabolic reflector for each fluores-

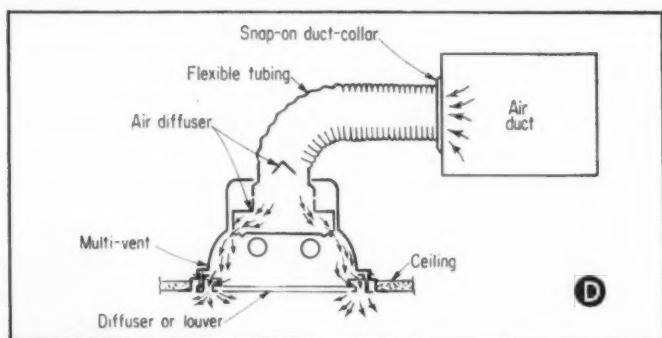
cent lamp with adequate crosswise shielding, and the use of wedge-shaped louver fins having a parabolic cross-section, spaced closely to provide adequate shielding along the length of the troffer.

Another development in troffer lighting is to use the troffer as a combined light and air diffuser (illustration D). This principle has also been used with louver and diffuser ceilings. This reflects a trend to cleaner looking ceilings with less structural clutter.

Typical of the many improvements being made in construction and installation features, which save time and labor in installing, is the leveling support shown in illustration E. Individual manufacturers are constantly working on such improvements.

Both louvers and diffusers are made available by most manufacturers for troffer shielding. Louvers (illustration C) are generally available in a variety of cell sizes, in steel with aluminum or enamel finish, in aluminum with specular or diffuse finish, and in plastic. Diffusers are generally available in glass or plastic, and in prismatic lenses of glass or plastic.

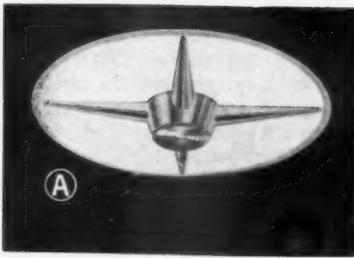
All troffer designs must be adaptable to many types of ceiling construction, to meet the existing wide variety of suspended ceilings. The principal design types are: troffers with flanges, for plaster ceilings; troffers which conform with ceiling tile modules and are installed with bottom edges flush with ceiling line; and troffers for installation in inverted "T" type ceilings, which permits interchange of troffers and tile panels for added lighting flexibility.



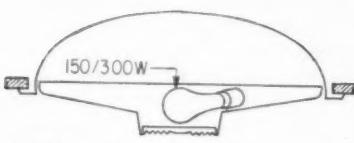
Light and Air Diffuser Troffer

Recessed Incandescents

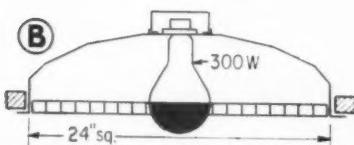
Incandescent Domes



Standard Lamp Unit



Round or Square



Silver Bowl Lamp Unit

INCANDESCENT lighting continues to be popular for many lighting applications. One reason is probably the psychological and emotional response of people to the characteristic "warmth" of the light produced by filament lamps. Another is that these lamps are point sources of light, which makes possible accurate directional control of the light produced, and thereby more effective and dramatic lighting effects. Also, the subtle and flexible control of intensity of light, with dimmers, makes the incandescent lamp preferable where projected and controlled light in a range of intensities is desired.

There are three fields of lighting application in which strong preferences for incandescent lamps still exist. One is in the home, which is discussed separately on page 88. The second is in retail establishments, especially in department and clothing stores, restaurants, and many types of specialty shops. The third is in the theatre.

In general, the same problems of lighting quality, elimination of

glare, and control of brightnesses obtain for recessed incandescent lighting equipment as for other types of luminaires. Units have been designed which adequately solve these problems, and today's trends are to the use of units of these types.

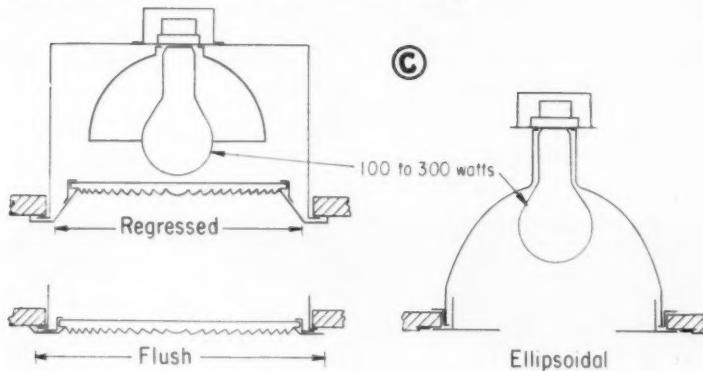
Recessed incandescent units are generally classified as one of three typical types. One is recessed domes, which are generally installed flush with the ceiling. Illustration A shows one design, which uses a standard incandescent lamp, and is available in either a round or square design. The lamp is well concealed within an ornamental design, above a fresnel-type lens, and the diffusely-lighted dome needs no shielding. Illustration B shows a similar design, which uses a bowl-silvered lamp. It is available with either plastic or metal louvers, or glass or plastic diffusers, used primarily to shield the neck of the lamp.

Another typical type uses standard lamps, and various methods of controlling the light and shielding to prevent glare. Illustration C shows two types. One type uses a spherical reflector in conjunction with a fresnel lens, which may be installed either flush with the ceiling or recessed above the ceiling. The other type shown uses an ellipsoidal type reflector, which accurately reflects the light from the lamp in an accurately controlled beam. A ring baffle which extends upward within the reflector is finished matte black.

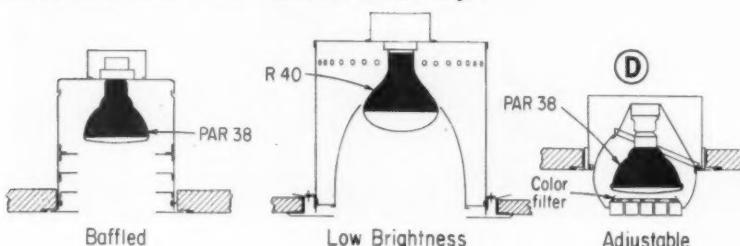
The third typical type uses reflector lamps and various methods of baffling and shielding to prevent glare. Three methods of shielding are shown in illustration D. One uses a series of flat rings, one above the other, and all finished matte black. Another uses a low-brightness type reflector (sinusoidal or parabolic), and the third uses concentric louvers in front of the reflector lamp. A color filter can be used with the third type, which is also adjustable.

The illustrations show only a few of the many types currently available, which represents current design trends in recessed units for incandescent lamps.

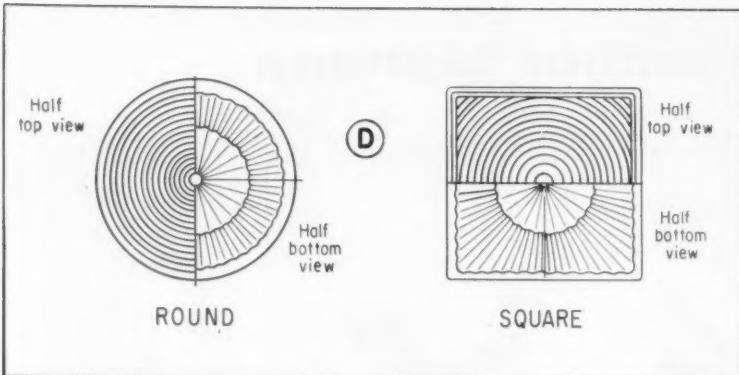
Recessed Units for Standard Lamps



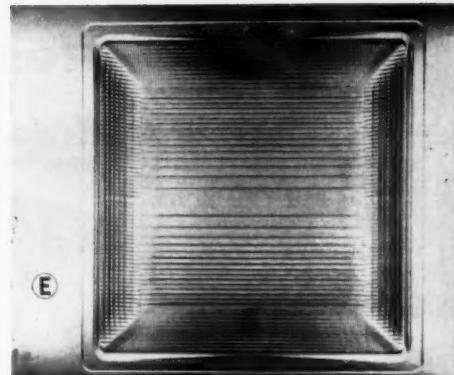
Recessed Units for Reflector Lamps



Prismatic Glass Lenses



Round or Square Lenses



Corridor Lens

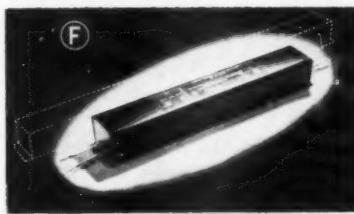
Ballasts and Transformers

fles, air conditioning outlets, sprinkler heads, PA system speakers, etc., also makes it necessary for lighting equipment manufacturers to add a variety of components of these and similar devices as a part of the lighting system.

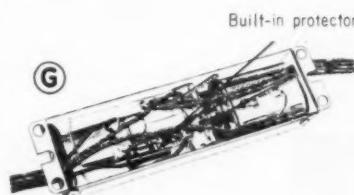
Ballasts and Transformers

Two problems are currently plaguing the lighting equipment producers and manufacturers of fluorescent lamp ballasts. One is heat, which is becoming intolerable in nonventilated equipment and the new wide-shallow luminaires which are often installed on nonheat-conducting ceiling materials. The other is the question of ballast protection. Both problems are under intensive study. Meantime, new trends are seen. Recent developments include: 3-lamp ballast for outdoor (0°F) starting; weatherproof unit for exterior mounting, without need for protective housing (I); built-in thermal protection, sensitive to temperature, voltage, and current; new coil design which provides much cooler operation; smaller (one can) ballast for 4-ft, 6-ft, and 8-ft PG, VHO, SHO lamps (F); and new unit designed for 122-volt line voltage operation.

Trends in mercury lamp transformers include: smaller and lighter units (H); pole-top, slip-fitter type, for converting residential incandescent street lighting systems to mercury; moistureproof units for pole-base mounting; and constant wattage indoor transformers, which maintain constant light output over wide voltage fluctuations.



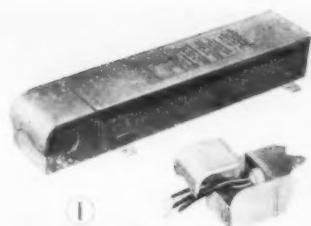
Smaller PG and VHO Ballasts



Thermal-Protected Ballasts



Smaller Mercury Lamp Transformers



Weatherproof Unit

The problem of heat in lighting systems goes far beyond the overheating of ballasts. Every watt of electrical energy used in the lighting system releases 3.14 Btu of heat. Thus, as more wattage is used to provide more footcandles of illumination, more heat is dissipated. How to cope with this problem is of growing concern to the lighting industry. Unless it is solved, it could greatly retard progress in providing the levels of illumination needed for better and easier seeing, which recent light and vision research has revealed is necessary.

The heat problem thus points up the need for increased emphasis on the selection of 1) lighting systems and light sources which operate most efficiently, and provide maximum lighting intensity with mini-

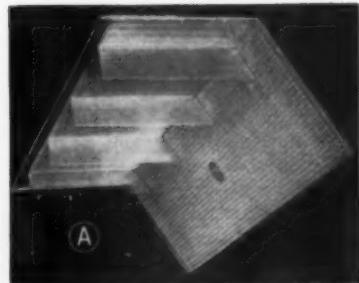
mum wattage, and 2) lighting systems which use luminaires and lighting equipment carefully designed to provide safe operating temperatures for ballasts, and suitable ambient temperatures for maximum operating efficiency of electrical discharge light sources used.

Lighting Components

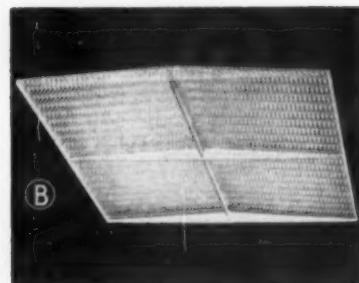
A LARGE number of the components and parts used in luminaires and lighting equipment of all types are not made by the lighting equipment manufacturers under whose brand names the equipment is sold. Actually, these components are made by a large number of specialty and allied manufac-

turers, and by firms whose major production, in many cases, is in fields outside the lighting or electrical industries. Thus all lighting equipment manufacturers are, to a degree, assemblers of components supplied to them by other producers. The major items in this category are plastic and glass products, ballasts and transformers, wire, lampholders and wiring devices, switches, etc.

Prismatic Acrylic Lenses



Two-Plane Refractor



Concave 24-in. Square Lens

A major trend in lighting equipment design, over the past few years, has been to an ever increasing use of plastics. This trend still continues. Current trends in plastic components, however, are primarily to improvements in quality, and to expansion of the individual types, styles, designs, sizes, light control features, etc.

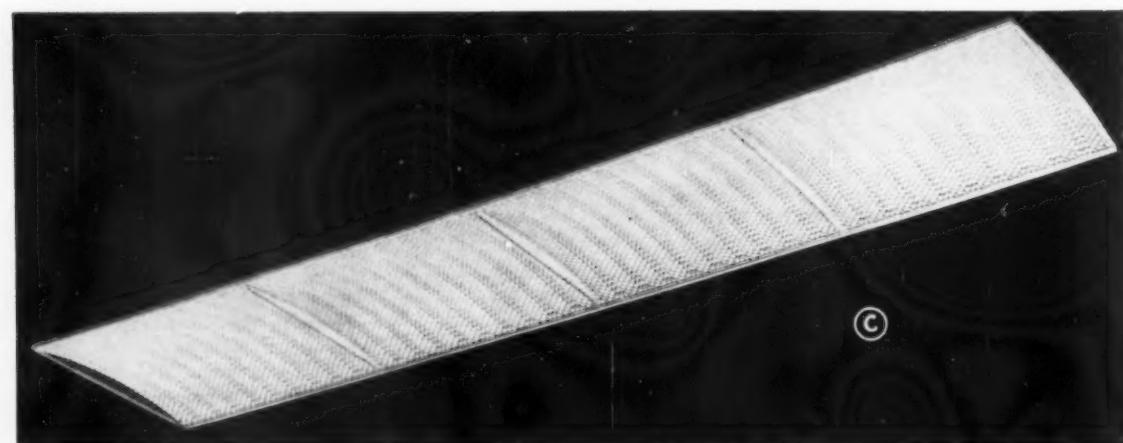
Plastics are used in lighting equipment primarily to provide light control. Three principal types of light control are involved: diffusion, louvering, and optical control. These types depend on transmission of light through the plastics. A wide range of sizes and shapes is available for all types. Individual pieces may be molded, extruded, or laminated. Three types of plastics are in general use—acrylic, vinyl, and styrenes. Generally, these are available in struc-

tural corrugated, decorative flat, and complex molded patterns and shapes. Examples are illustrated on this page, and on pages 82 and 83. Extruded hollow shapes, which provide structural strength, for luminaire side members, T-rails, etc. are also finding increased use. A current trend is also to injection molded acrylic prismatic lenses (illustrations A, B, C) for maximum optical accuracy. Other trends are to matte surfaced diffusers, for elimination of specular reflection, to clear and white prismatic patterns, to incorporation of acoustical properties in diffusers, and recently to incorporation of light polarizing properties in sheets of diffuser panels.

Glass In Lighting

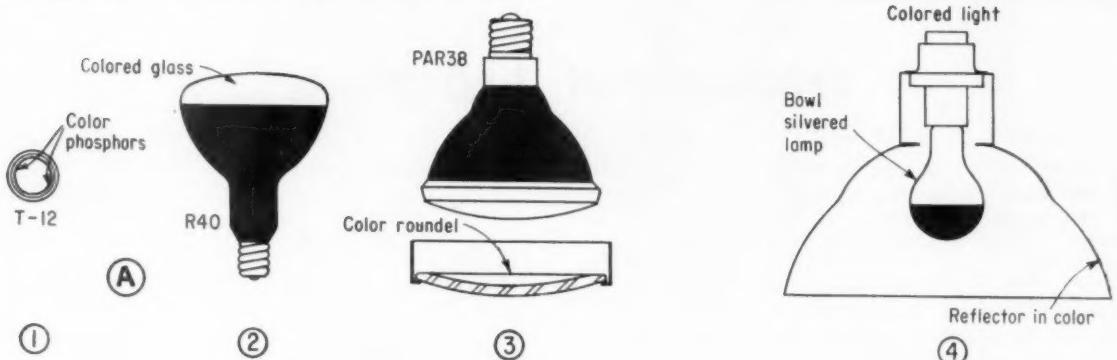
Glass has been replaced by plastics for many uses in luminaires. However, glass continues to be used as lighting components for a wide variety of applications, especially where heat is a problem. These include prismatic and fresnel lenses (illustrations D, E), cover glasses for outdoor floodlights, color roundels, diffusing lenses for troffers, and panels for diffuser ceilings. New designs incorporating new properties and improved features continue to be announced.

The trend to multi-purpose ceilings, incorporating acoustical baf-



Concave 1-Ft x 4-Ft Lens

Lamps and Devices Produce Colored Light



Color In Lighting

ALL light has color. There is no such thing as colorless light. Therefore every lighting specialist, architect, engineer, or others who plan a lighting system is dealing with color in lighting, either consciously or unconsciously. To know and to fully understand color in all its phases is thus of utmost importance in planning a visually and psychologically pleasant visual environment, for any and every type of interior or occupancy.

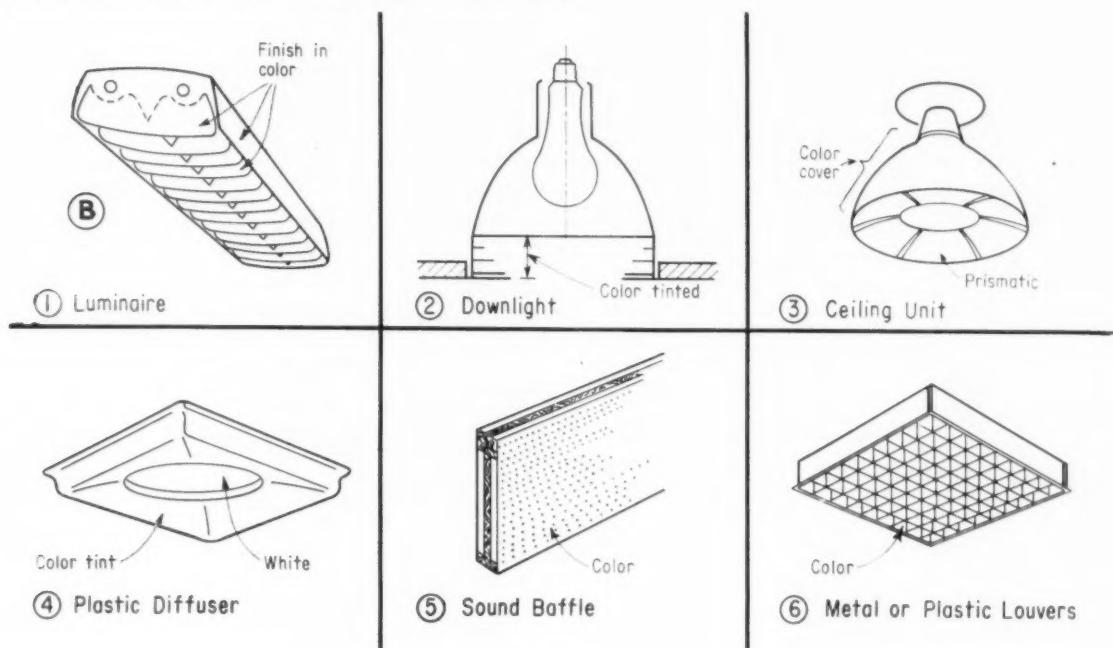
Color can be used in lighting application design for emphasis, and for special dramatic effects. This can be done in two different ways. One method is to use lamps which

produce colored light, or to use color filters with lamps which produce "white" light. Four examples are shown in illustration A above. Fluorescent lamps (1) produce colored light directly through the use of special color phosphors. Incandescent lamps (2) produce colored light by the subtractive filter method, by making the lamp bulb of colored glass, or (3) by using a separate color filter. Colored light can also be produced (4) by using a colored reflector so designed that only reflected colored light is emitted from the reflector.

The other method is to add decorative color elements to lighting

equipment. Typical examples are shown in illustration B below. In this method, color is used in such manner as to give a psychological impression of color from equipment which is producing "white" light. Visible parts of the luminaire in (1) are finished in color. Only the baffled area of (2) is color tinted. A color overlay is used on (3). The plastic diffuser in (4) has part of its color impregnated. Color filters may also be laid over plastic diffusers of this type. Sound baffles used with diffuser ceilings (5), may be color finished. And the fins of metal or plastic louvers may be finished in color.

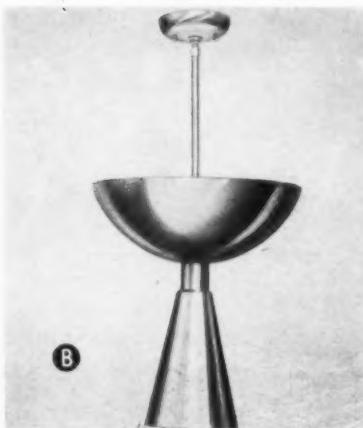
Color Decorated Units Produce White Light



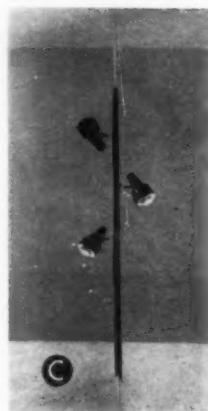
Residential Lighting



Floating Luminous Ceiling for Bathroom



Direct-Indirect Luminaire



Portable Floor-to-Ceiling Tree

RESIDENTIAL lighting equipment manufacturers today face a real challenge. Allied groups in the electrical industry are pressuring for a tremendous upgrading in residential lighting equipment designs, and in lighting application

practices in the home. Some progress has been made, and tremendous strides are predicted in the months and year ahead.

Certain clearcut trends are reported to be emerging now, which are briefly outlined here.

More lighting units are needed to light a home adequately than are normally installed.

There is an expanding use of structural and built-in lighting elements. Luminous ceilings (for kitchen, bath and utility areas—illustration A), coves, lighted cornices, valances, wall brackets (illustrations D and E), are examples.

Reflector lamps and housings, for both surface mounting on ceiling and for recessing, are growing in popularity. Recessed incandescents, discussed on page 85, are also being used to light homes.

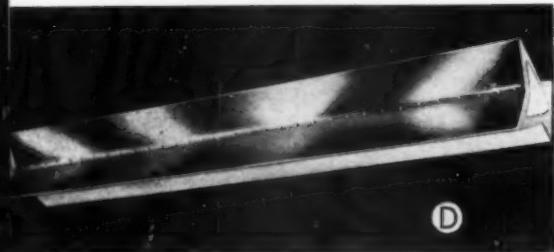
In typical residential luminaire design, the trend is to luminous shades of glass, plastic, woven materials, and away from opaque shades, including pierced metal.

Home owners are showing interest in texture, filigree, open work, etc. in luminaire design and materials. Luminaires are more open and more light in appearance, use less ornamentation, control the light more satisfactorily.

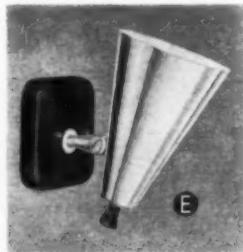
Suspended luminaires are popular, whether individual or of three, six, 12 or more cluster types, indicating a trend of making lighting devices serve a decorative purpose. This stresses the need for even better inherent good design.

The trend to greater lighting flexibility in the home is reflected by the popularity of reels, ceiling tracks, counter weighted wall units, and the movable electrified column on which lighting units are placed.

Wall Brackets



Fluorescent Direct-Indirect



Incandescent

Garden Lights

Parasol



F

Mushroom

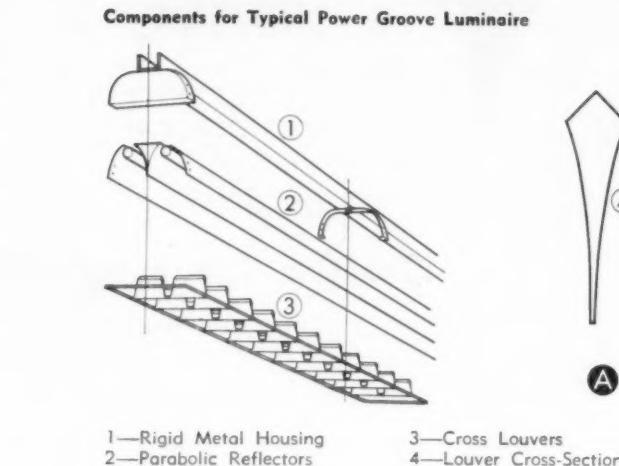


G

Industrial Lighting

INDUSTRIAL lighting practice has improved significantly in recent years. The lighting of factories for war production, during World War II, was the big turning point. At that time production management first accepted generally the concept that good lighting is a good production tool, and illumination levels were upped from a general average of 20 to 25 footcandles to 75 to 100 footcandles. Progress has continued postwar, so that today the generally accepted minimum intensities for production areas range from 100 to 500 footcandles, depending upon the severity of the seeing tasks involved. Current trends are to even higher levels, with greater emphasis being placed on lighting quality, better brightness ratios, improved shielding, and features contributing to easier maintenance.

Current trends in lighting equipment design are to luminaires which employ high light output lamps, and to even better light control and shielding. Fluorescent luminaires for the new 25-watts-per-foot lamps (PG, VHO, SHO—illustration A) use parabolic type reflectors for each lamp, deep enough to provide good cross shielding, and special wedge-shaped louvers for good longitudinal shielding. Luminaires are designed to permit from 10% to 30% upward components of light, for satisfactory brightness control of the lighted unit when viewed against the lighted ceiling above. These high light output luminaires, and better control of glare and surrounding brightness,



Two-Lamp Power Groove Luminaire (Without Louvers)



B

are needed to provide the new higher levels of illumination now being recommended by the Illuminating Engineering Society as a result of the recently completed studies of light and vision (Blackwell Report) which indicate the desirability of illumination levels up to 10,000 footcandles for certain industrial visual tasks.

For high bay installations of 30 ft and above, mercury lamp reflector units (illustration C) continue to be popular and generally preferred. New reflectors, such as the unit shown, have been designed to incorporate features necessary for the maximum quality lighting which is dictated by high intensity lighting. These features include: deep shielding, to prevent direct glare; upward light component, to light ceiling softly and reduce brightness contrast between luminaire and ceiling; smooth reflecting surfaces, to minimize maintenance;

ventilated socket and housing, to provide cool operation, and an upward draft action to minimize dust and dirt collection on lamp and reflecting surface.

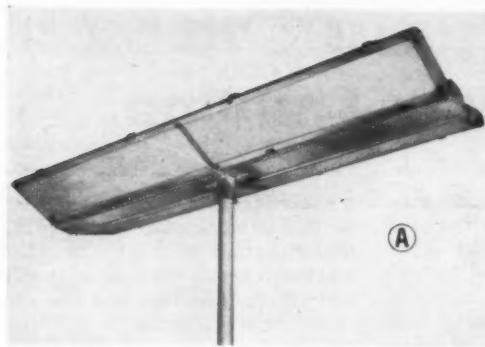
Incandescent reflector units continue to be popular for utility areas and for warehouse or other similar areas where low lighting levels, up to 15 or 20 footcandles, are indicated. Incandescent reflector lamps of 2000-hour life rating, installed in a protective metal housing, are also popular for installation in hard-to-get-at locations.

In certain types of industrial applications, high level lighting intensities of 300 to 500 footcandles are provided by semi-localized continuous runs of fluorescent luminaires (over assembly lines, or inspection areas, for example); and a lower level intensity of general illumination (100 footcandles, for example) is provided throughout the area.

Mercury Vapor Luminaire



C



Island Light



Outdoor Substation Unit



Garden or Path Light

Outdoor Lighting

OUTDOOR lighting continues to grow in importance, and in market potential. It is needed for many purposes, and for a wide range of seeing tasks. It involves many types of equipment, and a broad range of light control principles and lighting application techniques.

Design trends in outdoor lighting equipment are being influenced greatly by the trends in light source design and development. As larger and more efficient light sources are made available, new and better outdoor lighting units are developed to use these light sources most effectively and most efficiently.

In general, fluorescent and mercury lamps are being used for nearly all types of outdoor lighting applications. The higher light output of these lamps per watt, and their long life characteristics, are primary influencing factors.

Floodlights formerly designed for use with incandescent lamps

have been redesigned for use with the new, more efficient, and color-corrected mercury lamps. These are being used on an ever-widening basis for both area and decorative floodlighting. Outdoor units, both open and enclosed types, are rapidly being made available for all sizes of mercury lamps, up to and including the new 1500-watt size (illustration H, page 95). Typical of specially-designed mercury luminaires for special lighting applications is the new prismatic glass enclosed outdoor substation unit (illustration B). Most importantly, mercury lamps seem to offer greatest opportunity for further technological improvements—better light control, more light per dollar.

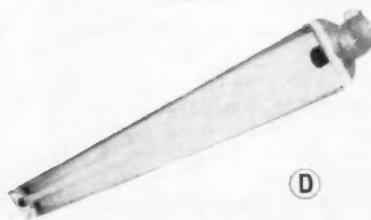
The new high output fluorescent lamps (PG, VHO, SHO) are being adapted for use in a wide variety of outdoor lighting equipments (illustrations A, D, E and F). Gasoline service stations are using the new island floodlights (illustration A),

and pole-mounted floodlights (illustration E), as well as mercury lamp floodlights, for general area lighting. Lineal floodlights (illustration D) are becoming standard units for lighting billboards, outdoor signs, and building fronts. Heavy duty weatherproof fluorescent units (illustration F) are being used widely for many area lighting projects, such as for loading platforms, docks, etc.

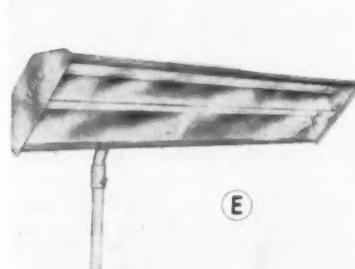
Another outdoor lighting field that is growing rapidly is that of outdoor residential and garden lighting. Incandescent lamps remain popular for this field, and a wide variety of units (illustration C above, and illustrations F and G, page 88) are available.

Floodlighting of buildings and monuments continues year after year. Reflector lamps in metal cornices on close spacings have been used to wash building fronts with light, and fluorescent lamps are now being adapted to this use.

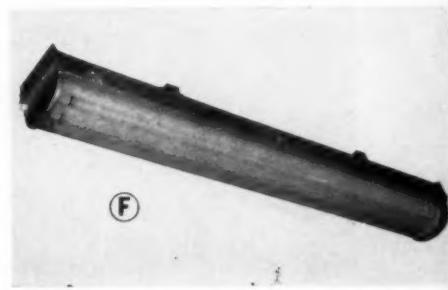
Outdoor Fluorescent Floodlights



Outdoor Sign Light



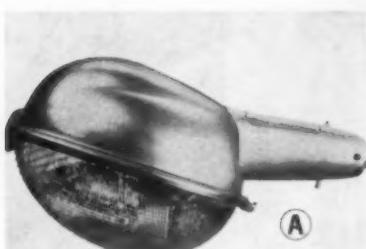
Typical Floodlight



Dock Light

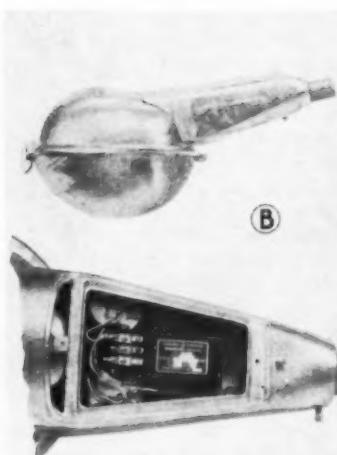
Street and Highway Lighting

Mercury Vapor Luminaires



700-Watt

(A)

250/400-Watt
Ballast In Fitter

(B)



Uni-Directional 400-Watt

(C)

RECENT developments in luminaires for street and highway lighting, and in allied equipment, such as light sources, ballasts and transformers, poles, brackets, electrical controls, etc. have been many and varied. These developments have provided a firm base for future growth in this specialized lighting field. Luminaires and equipments are already available which will provide much higher lighting levels, with better visual comfort, and with greater economies in both first costs of installation, and in maintenance and operating costs.

The sales of street and highway lighting equipment for 1958, including the lighting of viaducts, tunnels, underpasses, bridges and overpasses, roadway signs, etc. are estimated at about \$33 million. Some \$5 to \$6 million of this is for highway lighting, the remainder for street lighting.

The potential for market expansion in the field of street and highway lighting is generally recognized as stupendous. While various dollar estimates have been made, they seem to be rather meaningless. It seems more practical, therefore, to discuss the areas of activity within which lie the tremendous potentials for future market growth. There are two such areas—specifically, new street and new highway construction, and modernization of existing streets and highways.

Construction of the National System of Interstate and Defense Highways, the 41,600-mile project authorized by the Federal Highway Act of 1956, is now in its third year of operation. Already completed are 1600 miles of this project, with another 3000 miles now under way. This program is scheduled for completion about 1970, and is being financed 90% by the Federal government, 10% by the states.

Paralleling this is another huge program of building and modernizing primary, secondary, and urban highways, financed on a 50-50 basis by the Federal government and the individual states.

Another activity which now seems to be getting under way, on

a much larger scale, and possibly reflecting a significant trend, is the modernization of streets in cities and towns across the nation. In this activity, the installation of new and better street lighting is a major factor. For example, Brookings, S. D., recently relighted all 35 miles of its streets with fluorescent; Upper Darby, Pa., installed what it termed the "world's brightest whiteway"; and now State Street in Chicago has under way a relighting project which will undoubtedly set a new record for whiteway lighting. There are many other street relighting projects now under way, many more in the planning stage.

General Lighting Trends

One of the most significant trends in street and highway lighting is that of higher levels of illumination, with better control of light distribution, and consequently with a reduction of glare. Also, the trend is to the use of mercury and fluorescent light sources. This trend automatically obsoletes the thousands of incandescent lamp systems now in use. Other trends include: higher light output lamps (mercury and fluorescent); larger luminaires; individual photoelectric control of luminaires; fluorescent floodlights for lighting highway guide signs; and many others.

Mercury Luminaires

Competition is keen between the proponents of mercury luminaires, and the proponents of fluorescent luminaires. And the competition increases as new and larger luminaires of each type, incorporating new and improved features, are announced. Appraised objectively, it is readily evident that both types provide the means of achieving new and higher standards—higher intensities, better color quality, reduced glare—on a more economical basis, overall.

Shown in illustrations (A), (B), and (C) are examples of recent developments in mercury luminaires.

The unit in illustration (A) is a typical example of the trend to

larger luminaires, with higher light output. It is designed for use with a 1000-watt clear or color-corrected mercury lamp, which may also be operated at 700 watts, for longer lamp life, and for improved lumen maintenance. This unit has a one-piece combination reflector-housing, and a heat-resistant glass refractor. Also available is a broad range of somewhat similar, but smaller units.

Another development is a new luminaire for use with 250 or 400-watt lamps in which the lamp ballast is incorporated in the luminaire housing (B). This unit also has provisions for an individual photoelectric cell to be installed in the housing. These features provide new wiring economies and help to simplify power distribution and installation of luminaires.

A new type of luminaire, which embraces a new idea in roadway lighting, is shown in illustration

(C). This is a uni-directional 400-watt unit, designed for medial strip mounting. Suggested mounting height is 30 ft, at 300-ft intervals.

Fluorescent Luminaires

A strong contributing influence to the adoption and use of fluorescent lamps in street and highway lighting luminaires has been the inherent high efficiency and long life of these lamps. Efficiencies range upward to 65 to 70 lumens per watt, compared with 45 to 50 lumens per watt for mercury lamps. Introduction of the new super-powered higher-loaded (25 watts per ft) lamps in 1957 makes more practical than ever the use of 6-ft fluorescent lamps for street luminaires.

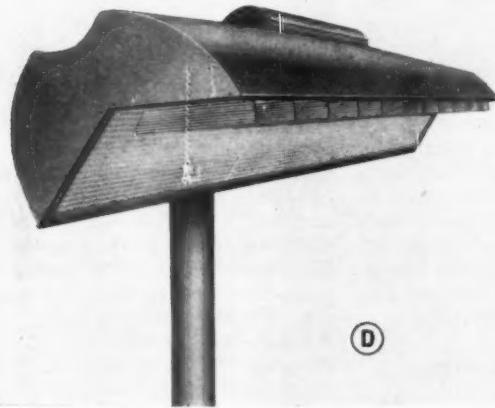
Shown in (D) is a new two 6-ft lamp fluorescent luminaire, designed for parallel-to-curb mounting. It uses a one-piece two-plane prismatic refractor, made of acrylic

plastic, which incorporates external louvers to control brightness.

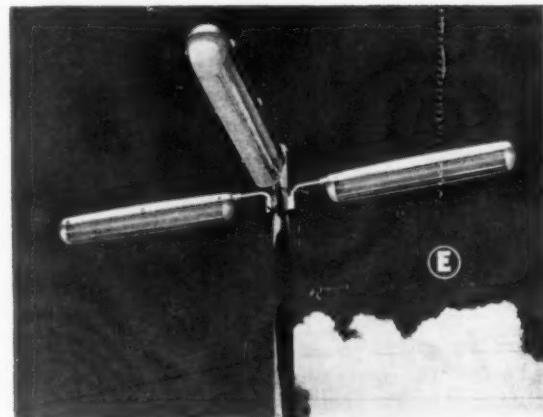
Shown in (E) is a new technique for higher level street lighting. It is described as a "Tee-lighting" luminaire, and consists of two 2-lamp units (G) mounted parallel to curb, and one unit (F) incorporating two, four, or six 6-ft PG lamps, installed normal to curb and extending out over pavement in the conventional manner. The parallel-to-curb units have a one-piece unidirectional reflector (G), designed to direct light onto the pavement.

The six-lamp, 55,800-lumen luminaire shown in (F) is believed to be the world's largest and most powerful fluorescent unit. Its internal temperature is thermostatically controlled by a specially-designed system of recirculating fans and centrifugal blowers, to provide proper ambient temperature for maximum light output in any type of weather.

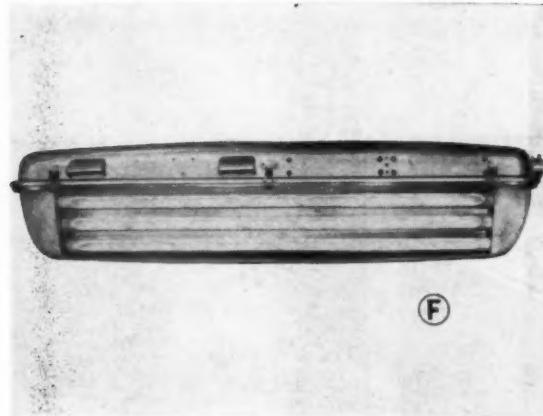
Fluorescent Luminaires



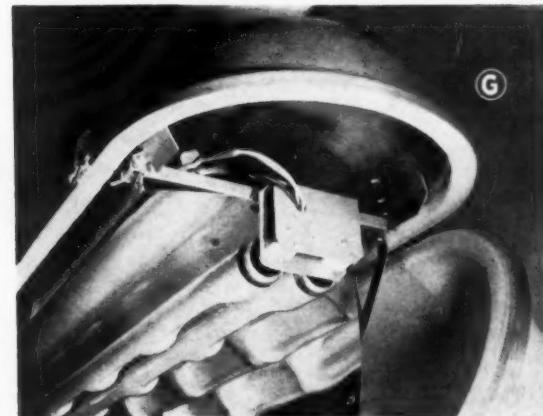
Parallel-to-Curb With Linear Refractor



Tee-Lighting Design



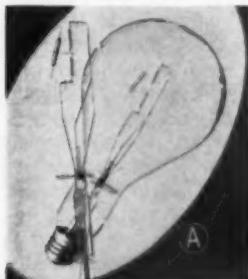
Six-Lamp Fan-Cooled Unit



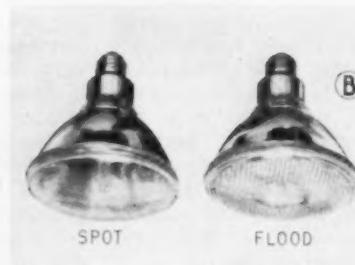
Two-Lamp Unit With One-Piece Reflector

Light Sources

Incandescent Lamps



Coiled-Coil Axial Filament



PAR-38



60-Watt and 100-Watt



New Shape

THE collective objective of the diversified lighting industry is "more light for more people at less cost". Over the past quarter century the industry has set a spectacular record in this direction. The annual per capita consumption of light (lumen-hours) is today approximately ten times as much as in 1933, it is estimated. Moreover, today's unit cost of light is only about one-third as much as it was 25 years ago. A major contributing factor to this outstanding accomplishment has been the tremendous improvements made in light sources—more types, higher efficiencies, longer life, greater light output per lamp, more colors and better color quality, and lower light source cost per unit of light. And the trend is to continued improvements, but at an accelerated pace. Expanded research and development programs, and the demand for higher lighting intensities, are strong factors.

The ever-increasing and exacting demands of current lighting application practice are met today through the use of incandescent, fluorescent, and mercury lamps, either alone or in combination, from a broad and extensive range of several thousand sizes, shapes, colors and wattages. Basically, incandescent and mercury lamps are *point* sources of light, and fluorescent lamps are *linear* sources of light. Under research and development is another type of light source, electroluminescent, which will be an *area* source of light. Current trends in these light source types are discussed separately below.

Incandescent Lamps

Incandescent lamps, invented by Edison nearly 80 years ago, still account for nearly two-thirds of total annual dollar volume for all types of lamps sold for general lighting pur-

poses. Incandescent lamp efficiency, however, may be near practical limits, at about 23 lumens per watt. Current trends and recent developments in these sources are shown in illustrations A through D, above.

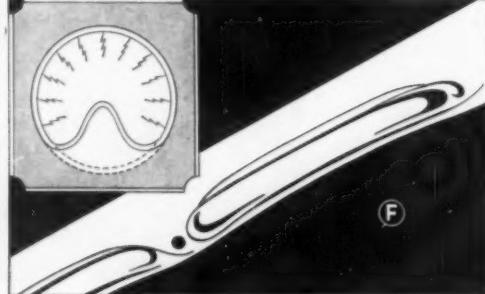
A recent improvement in filament construction (A) resulted in efficiency increases of up to 15%.

Reflector lamps, which have become popular in the post-War II years, are growing in application and use. The 150-watt PAR-38 spot and flood lamps (B) are currently the most popular of the many sizes and shapes available. Incandescent lamps continue to be the popular type for residential lighting, and the most popular sizes are 60- and 100-watt (C), with demand about equal for each. A new shape incandescent lamp (D) was recently announced, designed primarily for residential lighting use. Silica coated inside, the new shape increases surface area, provides maxi-

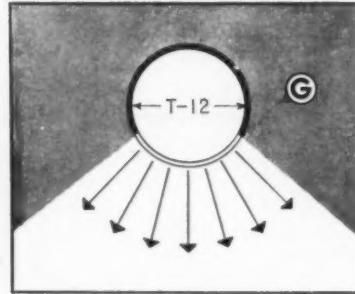
Fluorescent Lamps



Rapid Start



Very High Output (PG-VHO-SHO)



Reflector Type

mum diffusion, minimum surface brightness.

Mercury Lamps

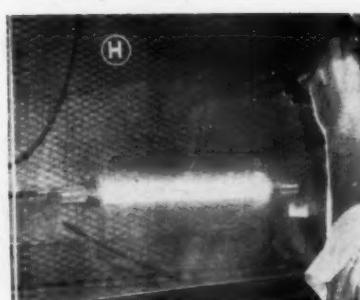
Fluorescent lamps were announced to the public just 20 years ago. Sales growth has been spectacular, from zero to in excess of \$80 million annually last year. While annual dollar volume is still only about half that of incandescent lamps, the total light output from fluorescent lamps sold each year now exceeds that from incandescents.

Current trends in fluorescent light sources include: increasing use of rapid start (continuous heated cathodes) lamps (E)—the 40-watt rapid start is today's most popular size; the 4-year-old high output (800-ma) rapid start lamp is continuing to grow in popularity—especially for high (100-300) footcandle lighting levels, and for low temperature outdoor applications; an accelerating demand for the new extremely high output (165 lumens per ft) lamps (F), which are expected to not only reduce the unit cost of light but also to play a major role in providing the new increased illumination levels being recommended by the Illuminating Engineering Society; and a growing appreciation and expanded use of deluxe type fluorescent lamps for better spectral color quality.

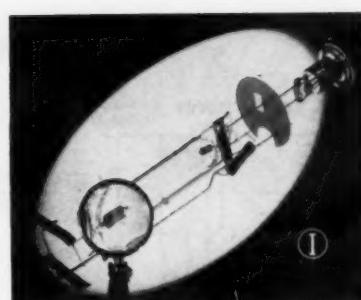
Mercury Lamps

Total sales of mercury lamps last year were less than 4% of the total for all types of light sources used for general lighting purposes. But increase in mercury lamp sales since 1950 has been approximately 200%, compared with a 60% increase each for both incandescent and fluorescent. Over the past three or four years, the line of mercury lamps has expanded greatly, so that it now embraces a variety of sizes, types, and colors. A new 1500-watt, 81,000 lumen tubular model (H) is now available, which is finding application for large area outdoor lighting. High efficiency, longer life, improvements in color quality of light, and the relatively high light output per lamp are some of the factors contributing to mercury lamp popularity.

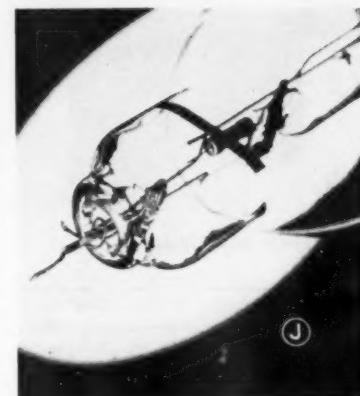
Recent developments and improvements include: reflector and semi-reflector types in 400- and 1000-watt sizes; heat resistant glass for expanded application in moist



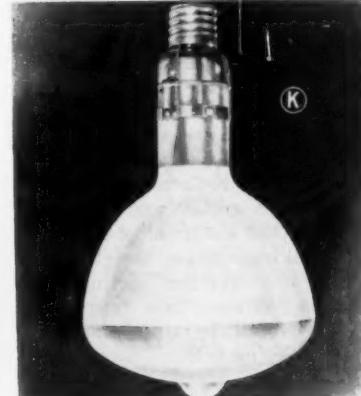
1500 Watts, 81,000 Lumens



New Cathode



New Cutout



Self-Ballasting

areas; new tri-metal double-wound cathode (I) for 400-watt lamps of all types, which increases light output throughout life of lamp by about 28%; new built-in cutout protective device (J) for lamps used in street lighting luminaires; and a self-ballasting 450-watt and 750-watt lamp (K) which combines incandescent and mercury light for an improved color.

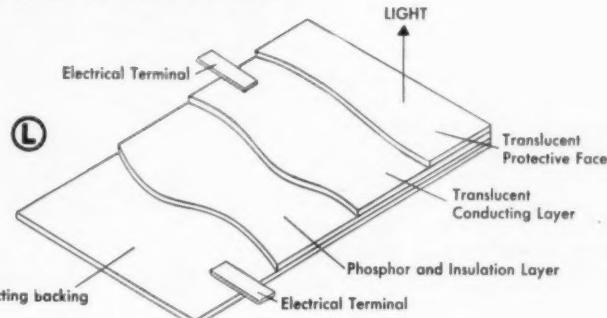
Electroluminescent Lamps

Under intensive study and research is the electroluminescent

light source, which is a two-dimensional panel unit (L), or area light source. It is currently used only for low-brightness applications. Efficiencies are still too low for consideration as a practical light source.

The future trends in light sources were aptly described, it is believed, by Kirk M. Reid, 1957-58 president of the Illuminating Engineering Society, when he said "The future? Expanded laboratory facilities and staffs may be expected to yield more and more new designs of light sources, along with steady improvements in existing sources".

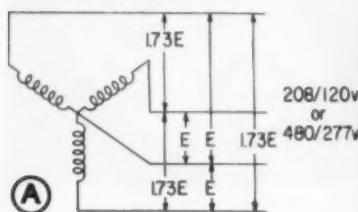
Electroluminescence Panels



Light Source of the Future?

Power for Lighting

60 Cycle Power



LIHTING system design today, more than ever before, extends well beyond the selection of light sources, luminaires and lighting equipment. Of necessity, for maximum flexibility, utility, and efficiency, it also includes the electrical distribution system and characteristics of the electrical power used. Of equal importance, therefore, are trends in power for lighting. Utilization voltages and frequencies affect overall lighting economies, and are being selected accordingly.

The basic power system for lighting in general use is the 60 cycle, 120/208-volt system. The trend is to 60 cycle, 277/480-volt systems where the lighting load is sizeable, or where both lighting and other heavy electrical loads are involved.

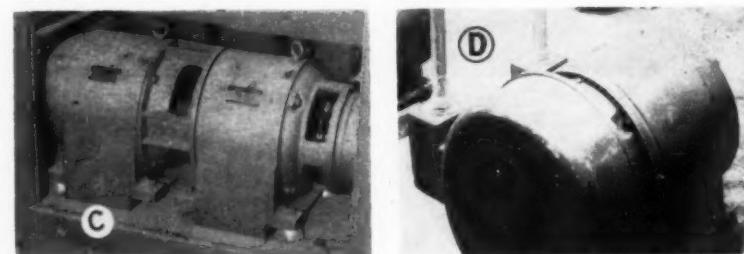
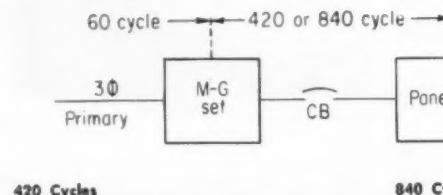
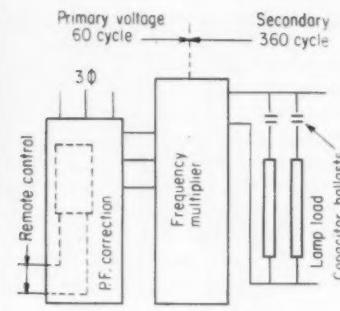
An inherent factor of electric discharge type light sources is that they produce more light for the same energy consumption when operated at higher frequencies. For this and other reasons, there is a growing interest in the use of high frequency power for lighting. More than 50 installations, of varying size, have already been made.

High frequency power is now obtained by converting 60 cycle power to the desired higher frequency and electrical characteristics. Three basic types of converters are now available. Static frequency multiplier and M-G converters transform the entire power load, which in turn is distributed to the lamp load at the higher frequencies and at higher voltages. Transistorized converters depend upon 60-cycle distribution at standard secondary voltages to lighting panels, where conversion is made to the higher frequencies for lighting branch circuit distribution. Lamp ballasts are greatly reduced in size at the higher frequencies.

High Frequency Power

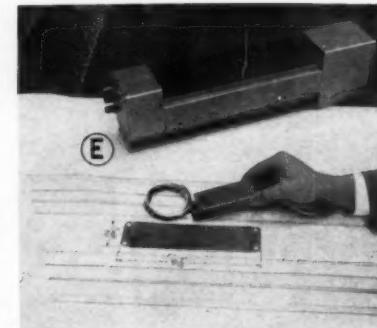


Frequency Multiplier

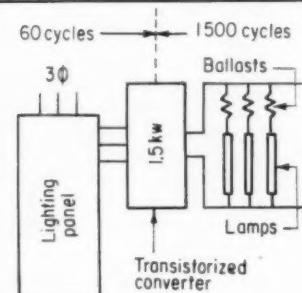


Motor-Generator Converters

Converter and Ballast



Transistorized Converter



Planning for . . .

Safety in Line Construction

Basic rules to safeguard electrical construction personnel from the hazards involved in work on high voltage transmission and distribution lines and in power plants and substations.

By Alfred L. Dowden, Electrical Engineer, Chief Engineer's Staff,
Liberty Mutual Insurance Co., Boston, Mass.

SAFETY for personnel engaged in high-voltage line construction and power work involves protection against hazards inherent in operation and upkeep of electrical power transmission and distribution lines.

Line work is divided into two distinct types. "Dead" line work is done with the lines de-energized and usually disconnected. "Live" line work is done with the lines energized. Modern line construction involves both types of work, depending on each particular job. And both types of work are hazardous.

"Dead" Line Work

"Dead" line work (sometimes called "cold" line work) requires that the line be disconnected from all sources of power. Special precautions should be taken to make certain that the line will remain "dead" during the process of the job. "Dead" line work requires interruption of service unless a circuit can be completed by some alternate route. Since most utilities strive to provide uninterrupted service, there is a tendency to avoid "dead" line work except where service can be maintained over an alternate line. This is often possible on transmission work, but seldom possible on distribution work. When "dead" line work is done, the safety of the job depends entirely on the precautions taken to keep the line "dead" because the men work with-

out protective equipment and handle the conductors with bare hands.

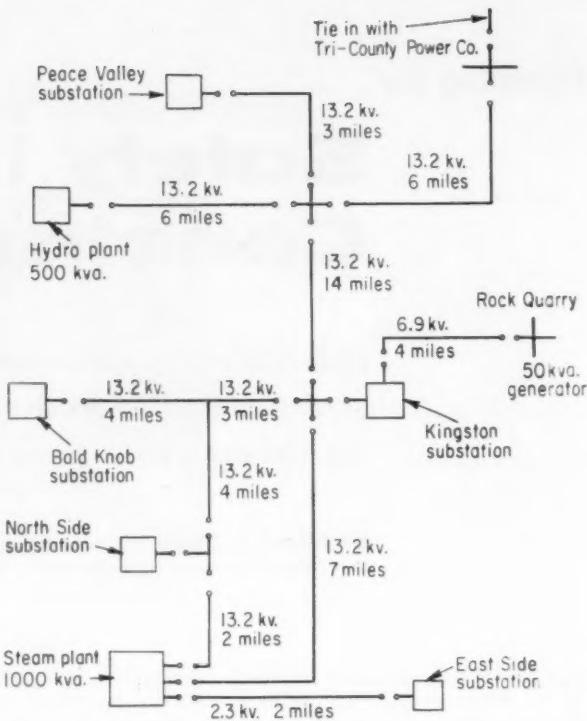
The first essential is an adequate "dispatching" plan on the part of the operators of the line system. Some one person must be responsible for the system and know the operating conditions at all times. The usual practice with utilities is to prepare a schematic line drawing of the system showing all transmission lines, substations and switches. Through the use of colored pins or lights, the position of every switch on the system is clearly indicated. All orders for switching must clear through the dispatcher.

Small companies frequently neglect to establish a dispatching system. However, this step should be taken on every system even though dispatching becomes a part-time job and occasionally leads to delays. The operating conditions of the smallest system should be definitely known at all times. Reference to the line drawing chart of the system would quickly reveal to an experienced lineman the switching necessary to insure a "dead" line. Failure to use such a chart or to properly appreciate the set-up has cost many linemen their lives. A good dispatcher will eliminate accidents due to linemen working on



PROTECTIVE COVERINGS for hot lines include rubber blankets (left) and line hose and insulator hoods (right). Check these for holes, tears, cracks, soft spots.

DISPATCHER'S CHART is a single-line diagram showing the transmission lines of a typical utility. All of the disconnect switches are shown by the open points in the line. The dispatcher inserts a red colored pin between the points to indicate closed switches. These switches are generally "air break" switches and are used to "sectionalize" the lines. There are also circuit breakers and other switches located in the substations which are used for switching under load. The "air break" switches are only opened when the load is off the lines. Reference to the chart shows that there are four sources of power on this system: 1. Steam Plant, 2. Hydro Plant, 3. Tie in with Tri-County Power Co., 4. Generator at Rock Quarry. There is an alternate circuit for supplying the substations at Bald Knob, Kingston and on the North Side. This means that "dead" line work could be done on several lines without interrupting service. The two parallel lines running east from the Steam Plant are on the same poles for part of the route; thus, "dead" line work might be done adjacent to "live" lines. A study of this chart will show you what switching must be done to provide safe conditions for "dead" line work on any section of this system.



lines that were thought to be "dead". And there will be less chance that a switch will be opened or closed when heavy current is flowing. There should be a written record or log book which records all switching done. And explanations should be entered so that a relief dispatcher will know exactly why certain switches are open or closed.

Fully as important for safety on "dead" line work is the use of a

"hold off" system. Each lineman is provided with tags or locks which must be placed on the open switches to insure that they will not be closed while he is working on the line. When the job is complete, the tag or lock is removed, preferably by the workman himself.

It is frequently physically impossible for the linemen themselves to tag the switches. In such cases, the station operator may do so for him. However, the station operator must

never remove a tag without direct orders from the person himself. In actual practice, the line crew foreman may take the responsibility for his entire crew. The entire "hold off" system should be under the control of the dispatcher who thus is able to make a further check, maximizing safety.

Even these precautions have proved inadequate on occasion. Men have been known to close switches even with tags hanging on them. There have also been cases of men hanging their tags on closed switches and then leaving them closed. They have even reported closed switches as open.

Since all of the above precautions might fail and it is essential that a final safety precaution be taken on "dead" line work, the conductors are actually grounded on both sides of the job. These grounds should be placed within sight of the job and should be placed before the job starts and removed after the job is completed. They should not be placed until all other precautions have been taken to insure a "dead" line. Grounding not only protects against the possibility of a "live" line, but it also eliminates current that may be induced by adjacent lines or by static (lightning).

This grounding is properly done



PERSONAL EQUIPMENT for working on hot lines includes rubber gloves and leather gauntlets (left) and rubber sleeves (right), checked carefully for defects.





SAFETY BELT is a vital piece of equipment to every lineman and should be thoroughly and carefully checked for defective stitching, worn leather and faulty clips and hooks.



CANVAS BUCKETS should be used with hand lines to raise and lower tools used on pole lines. Tools should never be thrown up to men on poles or dropped to ground from pole top.

with special grounding equipment which provides a ground rod which is first inserted into the earth. This rod is connected to a set of clamps which are placed in turn on each of the conductors.

When a pole is used for more than one circuit, it may be that "dead" line work is adjacent to a "live" line. Precautions must then be taken to keep clear of the "live" line.

"Live" Line Work

"Live" line work (sometimes called "hot" line work) has been improved greatly from the standpoint

of personnel safety as proper tools and procedures have been developed. A good "live" line crew properly equipped can handle all ordinary maintenance work efficiently and safely. Most distribution lines are handled by "trouble shooters" working with a minimum of protective equipment. This class of work is possibly the most difficult to include in the safety program.

A safety program for "live" line work calls for proper care and use of the "live" line tools and protective equipment. Line truck inspection is very important. It may well be conducted in the field where the

equipment is in actual use and where working practices of the line crew can also be observed. Suggestions for line truck inspections are as follows:

1. Rubber blankets, line hose and insulator hoods. Rubber blankets are used to cover transformer terminals and conductors. Line hose is used to cover conductors. It is slit along its length so it may be slipped over the conductor. Various lengths are used but 4 ft is the minimum for safety. Short pieces of hose may be used on taps. Insulator hoods fit over the insulators and cover the conductors at that point.

These items should be carefully examined for holes, tears, cracks, punctures and soft spots. The thickness of the rubber is the measure of its protecting value and the weakest or thinnest spot is the true measure of its value. Line hose may be turned inside out for examination.

Rubber blankets should be rolled and stored in a cylindrical container. Line hose and insulator hoods should be kept in special boxes or containers away from tools. If this equipment is packed while wet, it should be dried out as soon as possible. The drying should be done at normal room temperature.

2. "Hot" line tools. The important item on a "hot" line tool is the wooden handle. These handles are made of carefully dried wood which has been impregnated and waterproofed. These tools merit special care and should never be laid on the ground. They should have spe-



WOODEN HANDLES on all line truck tools and equipment, such as pike pole above, should be checked for splits, cracks, cuts and dents.



ROPE LINES should be carefully checked on a regular basis to assure sound condition and should not be left out exposed to weather.

cial waterproof canvas containers which protect them against moisture and abrasion. Tools which have been subjected to damp or wet weather should be thoroughly dried and tested before re-use. Periodic drying, sanding and coating with preservative is recommended. The manufacturer's recommendations should be followed. The fittings on "hot" line tools should be checked to see that they are firmly attached to the sticks and operate freely.

3. Lineman's personal equipment. Rubber gloves should be examined carefully. Look for punctures, cuts and cracks between the fingers. Trap little air in the glove by rolling it from the cuff end. This will blow up the glove and detect leaks. Be sure to turn the glove inside out.

Rubber gloves should be placed in individual containers or compartments when not in use. When used, they should be protected with leather gauntlets or gloves. Dielectric tests are recommended but should be made in accordance with specifications in the National Safety Council Safe Practice Pamphlet PU#3.

The safety belt has several features to be examined. Condition of leather must be good. Good leather is firm and reasonably stiff; old leather becomes soft and spongy. Look for cuts into the leather and also make certain that the leather has not worn to a thickness of less than $\frac{1}{8}$ in. which would warrant re-



SAFETY HELMETS should be kept on hand and used whenever job conditions warrant their use. They should be checked regularly for defects in their protective surface and for faulty condition of the inside head band. Defective helmets should be destroyed.

placement. See that the stitching of the body belt is in good shape. The "D" rings must be held tightly in the leather. See that the leather is not worn around the shank of the "D" rings. Also inspect the buckle to see that it is unbroken and holds positively. Check the snap hooks on the safety straps.

The climbers are very important. The spurs or gaffs are shaped differently to suit individual linemen,

but the spurs should be sharp and long enough to make a good bite. The length of the spurs depends somewhat on the class of poles being serviced. Minimum length is $1\frac{1}{2}$ in. measured on the inside flat surface of the gaff. Inspect the shank of the climber for cracks. Watch for worn straps.

4. Miscellaneous equipment. Ladders, canthooks, bars, axes, hand saws, etc., are typical line truck tools. They should be checked for condition. Wooden handles on tools should not be taped as this may cover up defects. Sharp tools should be provided with protection for cutting edges during transport.

Check measuring tapes. Metal tapes should not be used. Some cloth tapes are reinforced with metal wire. Check the tape carefully.

Hand lines and canvas buckets are used for raising and lowering tools. Metal buckets should not be used. All rope should be checked for condition.

No line truck is complete without a first aid kit and a drinking water supply. No line truck inspection is complete unless the safety of the truck as a motor vehicle is considered.

Working Practices

Working practices are fully as important as the equipment. Only a few general rules can be given.



TRUCK CONDITION should be carefully checked on a regular basis and before every job. Axles and undercarriage must be sound (left), tires must be good and all working parts



should be in order. Truck-mounted ladder assemblies (right) should frequently be examined in detail to eliminate any hazard due to defects.

REPORT SAFETY CHECK OF WORKING CREW - Overhead -	
Location Foreman Visited and inspected by	Date No. of men in crew
1. TRUCKS Condition of: (a) Steering mechanism (c) Head and tail lights (e) Rear view mirror (g) Flags available for projecting material (number) (h) Fire extinguishers (i) Miscellaneous REMARKS	
(b) Brakes (d) Horn (f) First-aid kit (i) Burn kit	
2. TOOLS Condition of: (a) Pike poles (c) Drills - Chisels (e) Saws (g) Shovels (i) Axes (k) Winch and cables (m) Ladders (o) Are cutting tools provided with proper guards? (p) Other tools REMARKS	
(b) Cant hooks (d) Ropes (f) Picks (h) Hammers (j) Blocks (l) Screwdrivers (n) Chains	
3. PROTECTIVE DEVICES Number and condition of each: (a) Rubber gloves (c) Rubber blankets (e) Grounding devices (g) Danger signs (i) Other devices Storage on trucks (a) Is line hose stored without bending? (b) Are blankets rolled or folded? (c) Are rubber protective devices stored in compartments with other tools?	
(b) Line hose (d) Insulator hoods (f) Pigs (h) Goggles	
4. LINEMEN'S PERSONAL TOOLS Condition of: (a) Belts and safety straps (b) Climbers (c) Other tools	
5. UNSAFE PRACTICES Give description of job visited and unsafe practices noted.	
6. REMARKS	
Signed _____	

SAFETY CHECK LIST of this type can be used by line superintendents to make regular safety inspections of line crews.

Careful supervision is necessary to determine if line crews are working safely. Here are a few comments that may help.

1. The work should be well planned in advance. The foreman generally should be on the ground directing operations. Kidding or horseplay among the linemen is poor practice and indicates lack of regard for the hazards.

2. Safety belts should be used whenever possible. This may be difficult to judge at times, but the belt should be put around the pole or cross-arm when the man reaches the height at which he will work.

3. Practices on rubber gloves vary. When "hot" line tools are used, they may not always be used. When working on distribution lines, they should be worn. They should be put on before getting within reaching distance of the danger

zone. Many companies require they be worn before the man leaves the ground.

4. Most work can be done safer from a point on the pole below the conductors because if the man slips he will fall clear of the conductors.

5. The pole itself should always be considered as "ground". It may be damp or be treated with preservative so that it serves as a conductor to ground. Many poles have a ground conductor fastened to them.

6. Tools should never be thrown up to men or dropped to ground. A canvas bucket and hand line should be used.

7. When solder is being used, a wooden tray should be hung from the wires so that the solder will not fall to the ground.

8. Before any pole is climbed, its condition should be carefully checked. It is customary to thrust

a sharp pointed tool into it at the ground line to determine whether it has rotted. If there is any question about the soundness of the pole, it should be guyed or braced with pike poles before climbing.

9. Warning signs should be placed on both sides of jobs along highways.

10. Work should not be started when rain appears likely. If it should start to rain, the line should be restored to service as quickly as possible and the tools removed.

Power Plant Inspection

In all electric power plants, there will be a switchboard and frequently considerable switchgear for operating the system. Switchboards and switchgear are generally designed properly. There are, however, several safety measures which should be taken at the switching equipment:

1. A rubber mat is desirable in front of the switchboard.

2. The back of the switchboard should be blocked off and locked.

3. Nothing should be stored in the enclosure behind the switchboard.

4. Switchsticks (used for opening and closing air-break switches) should be examined. If metallic fittings are used on these sticks, they should be small enough so they cannot span the gap between two conductors or from the switch to ground.

5. Switches and all electrical equipment should be plainly marked to show what they control. A station diagram showing all switches is evidence of good safety and production practice.

Safety Program

A Safety Educational Program should be intensive and continuous. Meetings of all linemen should be held regularly. Artificial respiration should be practiced at each meeting.

A booklet of safe operating rules for the system is essential and there are few Electrical Utilities that do not have a printed booklet of this type. Such booklets are also made available by R.E.A. and the U.S. Bureau of Standards. The booklet must be used constantly in safety meetings with the experienced men and in the training of new men. Otherwise bad practices will develop.

Expandable 12-kV Plant Distribution

permits substantial load growth with minimum capital outlay for electrical facilities at Austenal, Inc., investment-casting plant in La Porte, Ind.

By David Campbell,

Plant Engineer, Austenal, Inc., Microcast Div., La Porte, Ind.

HERE will be no electrical bottleneck when anticipated expansion begins at the Microcast Division of Austenal, Inc., La Porte, Ind. Wigton-Abbott Corp., Plainfield, N. J., designers and builders of the new investment-casting plant, provided Austenal's growth-conscious management with a distribution system that will give full capacity for three additional manufacturing buildings at minimum capital expenditures for electrical facilities. Provisions for dual 12-kv primary distribution serving 480-volt secondary unit substations was the answer.

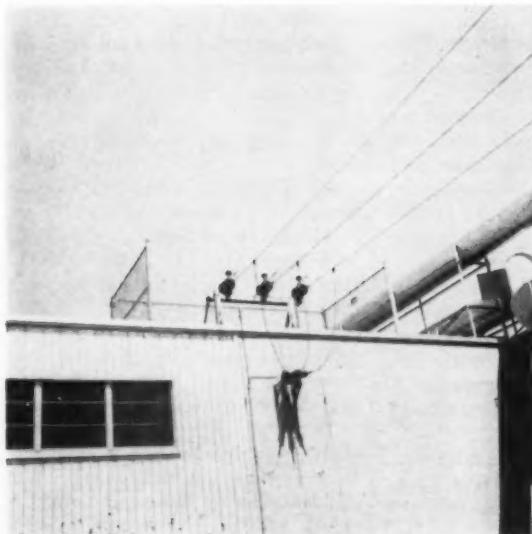
All electrical work in the plant was done by Square Deal Electrical Contracting, Inc., La Porte, under the supervision of Wigton-Abbott and Austenal engineers.

12-KV Pole Line

To insure adequate capacity for any anticipated growth, Northern Indiana Public Service Company brought a 69-kv transmission feeder to a 69/12-kv outdoor substation at the plant site. As plant load grows, the utility can build up transformer capacity to suit. Ultimately, two 69/12-kv transformers

in parallel at this substation will serve the expanded plant requirements from a 69-kv utility loop.

At present, one transformer and a single 12-kv circuit feeds the initial building. However, the present pole line from the substation to the building is arranged for double cross-arming so an additional 12-kv feeder may be run in the future without modification. When that occurs, the dual-circuit pole line can be extended to the new buildings and equipped with two-position selector switches at each building (Fig. 1). Normally, one half of the buildings then will be on each



DEAD-END bracket on roof terminates 12-kv aerial feeder at building. Wire fence is safety precaution. Detail is shown in photo at right.



12-KV POTHEAD supported by wall bracket connects aerial line with 3-conductor interlocked armor cable primary feeder in building.

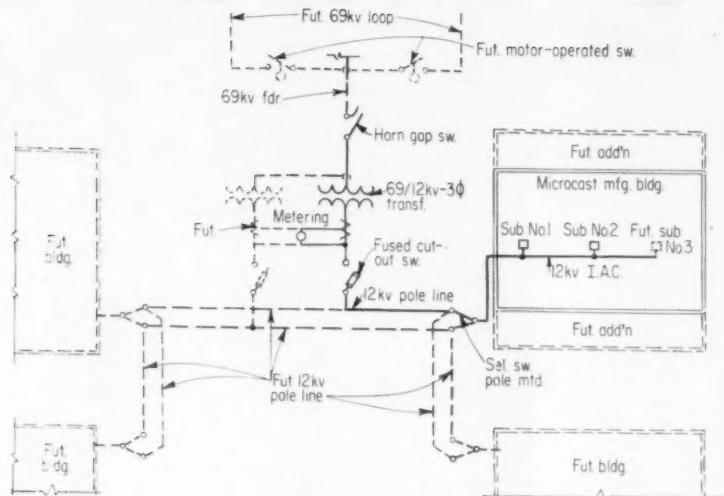


FIG. 1—Primary distribution diagram showing proposed dual-circuit 12-kv pole line to serve future buildings. Solid lines indicate present circuit.

feeder. Should one feeder or one 69/12-kv transformer fail, the remaining transformer and feeder will be able to carry the essential services of all buildings.

Service continuity, so vital in a casting operation using electric furnaces, is virtually assured. NIPS, the utility, has had no past outages on its 69-kv lines and its central service station is only three miles from the plant, with spare transformers, materials and repair crews immediately available.

To take care of any immediate expansion, the present 12-kv feeder is sized to accommodate the loading

of one additional building. Thus, growth in any size increments up to a full 650% of the initial building may be made without large capital expenditures. All power equipment initially installed will fit into the fully developed arrangement without modification. Increased capacity is gained by simply adding 12-kv/480-volt substations as required.

In-Plant Distribution

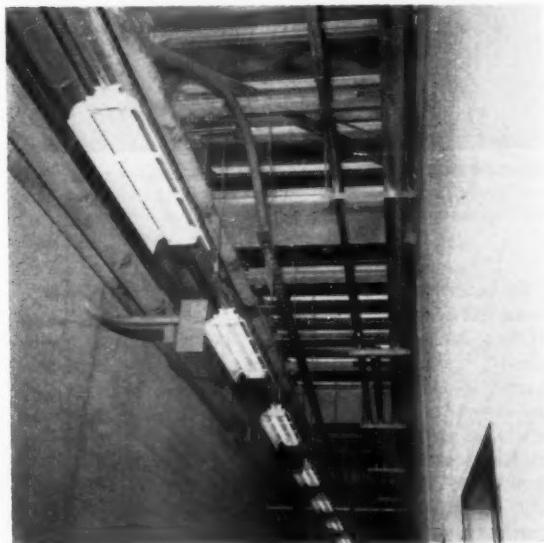
The 12-kv pole-line terminates in a dead-end bracket at the roof of the building. Here the circuit

enters the structure through a horizontal pothead and continues as a 3-conductor, 12-kv interlocked armor cable to two 1000-kva, 12-kv/480-volt unit substations on mezzanines located centrally to the electrical loads. A narrow, roof-suspended cable trough carries the 12-kv armored cable through processing areas and down corridors to the primary sections of the substations. A third substation can be added if necessary.

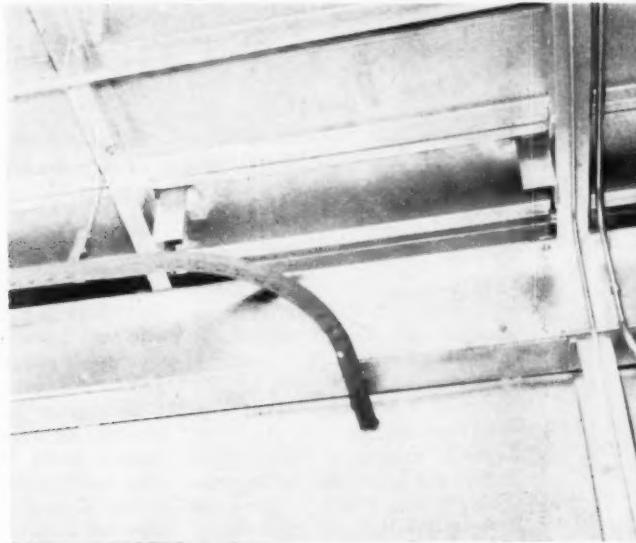
Secondary 480-volt, three-phase power distribution throughout the plant is by means of plug-in bus duct circuits originating at the unit substations (Fig. 2). Duct and substations have sufficient spare capacity to permit a 25% load growth.

Service for the 120-volt power and lighting (incandescent, fluorescent and mercury-vapor) is derived from the 480-volt bus duct lines through several 480/208/120-volt, dry-type, 3-phase transformers ranging from 30 kva to 150 kva in size. The largest feeds a 400-amp, 3-phase, 4-wire plug-in bus duct line serving eight lighting distribution panels. The others serve from one to four lighting panels each.

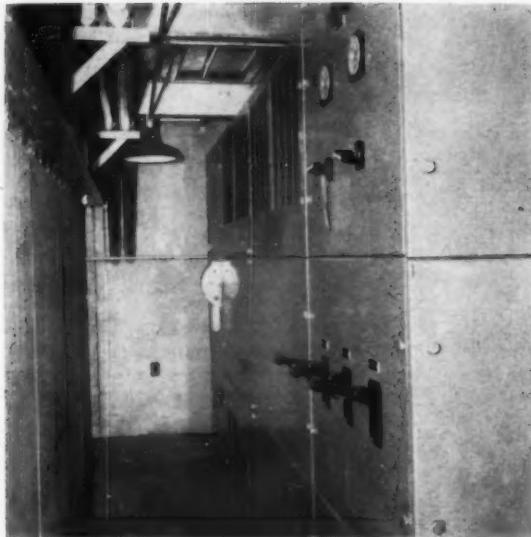
Among the critical electrical loads in the casting and heat treating area is a group of nine 25-kva carbon arc furnaces for batch-melting of metal used in the casting operations. Each of these single-phase, 480-volt units with its associated transformer and reactor is fed from a run of 600-amp, 480-volt, 3-



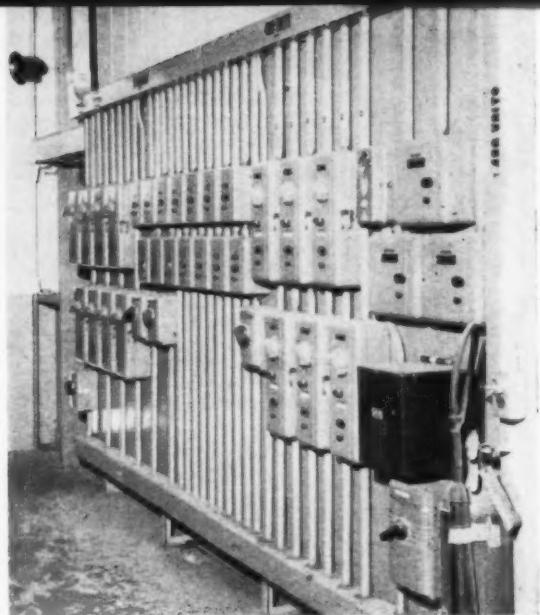
HIGH CORRIDORS are used for building utilities including 12-kv cable feeder (center) which loops up to unit substation, and 480-volt bus duct runs (lower left).



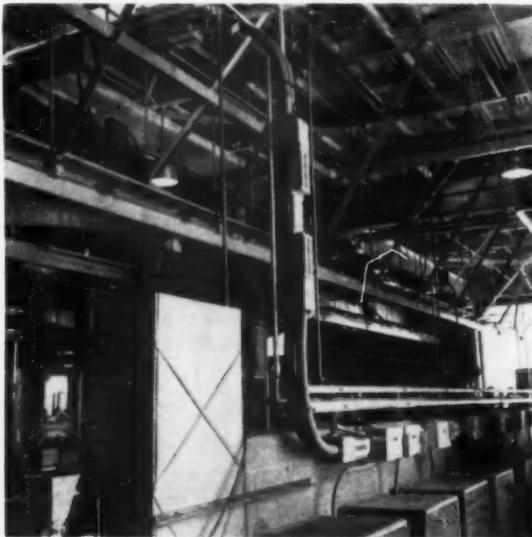
ARMORED CABLE, supported by narrow metal trough suspended from roof steel, comprises 12-kv distribution to unit substations.



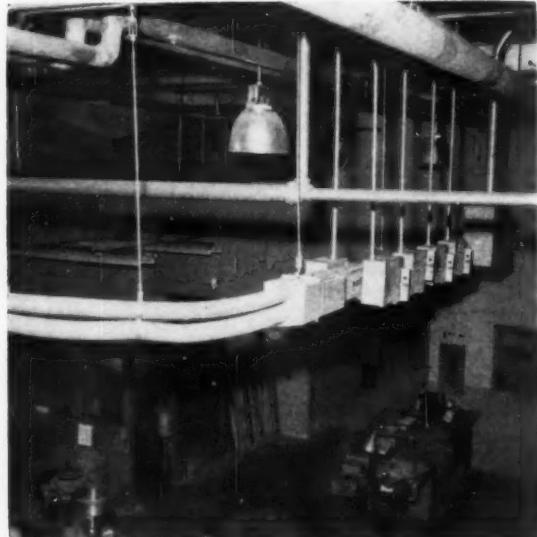
1000-KVA unit substation on enclosed mezzanine provides 480-volt, 3-phase secondary power; has ample spare capacity for future circuits.



STARTER RACK in casting and heat treating area accommodates some 36 controls for heating, ventilating, exhaust fan and vacuum pump motors.



FEEDER for group of 25-kva carbon arc furnaces is a 600-A, 480-volt bus duct run dropping to level of furnace transformer and reactor cages.



PLUG-IN BUS duct typifies 480-volt distribution pattern. This run serves tool room and boiler room air conditioning and heating equipment.

pole plug-in bus duct. Units are connected to alternate phases to balance the load. Circuit capacity is sized for the addition of six similar furnaces.

Control for heating, ventilating, exhaust fans and vacuum pumps in this area is centered in a large wall-mounted rack accommodating some 36 starters and controls. Runs of 4 by 4 square duct originating at top and bottom of the rack carry the circuit and control conductors up the wall and through roof steel

to the units involved. All raceways, like those in other areas, have decals or tapes identifying circuit voltage to simplify circuit tracing and future system changes.

Emergency lighting consists of a number of automatically charged battery units strategically located near lighting panels throughout the plant. Remote lighting heads are directed to corridors and rooms to provide ample egress illumination in case of a power failure. Battery units are connected to "lock-in"

breakers in the respective panels.

Approximately 10 kilowatts of floodlighting is used for exterior building and protective illumination. Five 1,000-watt ground level weatherproof floors cover the front of the structure. Protective perimeter lighting is provided by 11 clusters of three 150 reflector-flood lamps in weatherproof holders spotted along the roof line. All units are remotely controlled from the guard room near the front of the building.

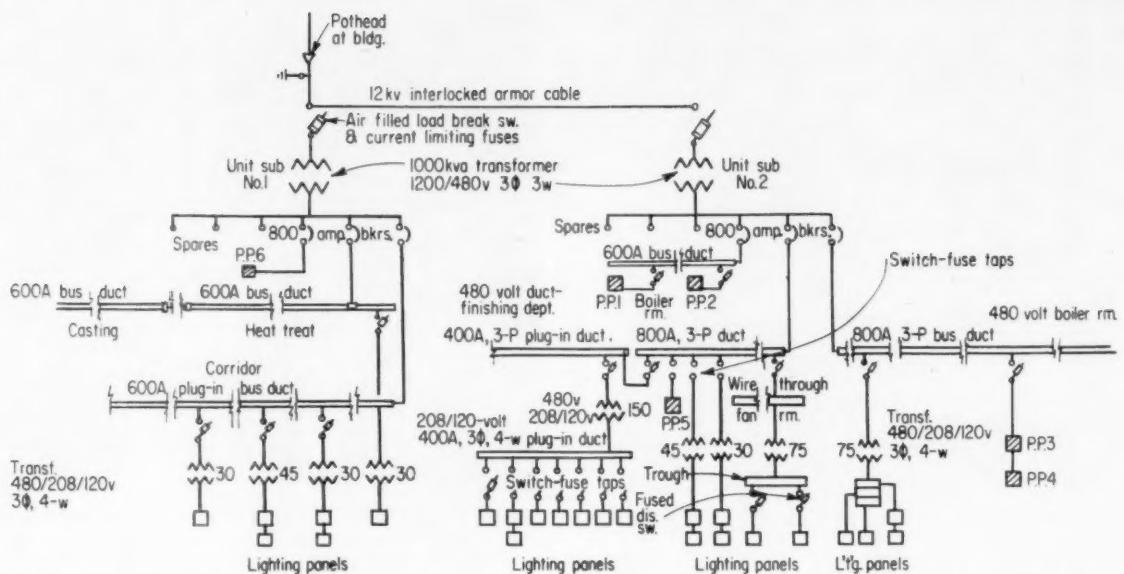
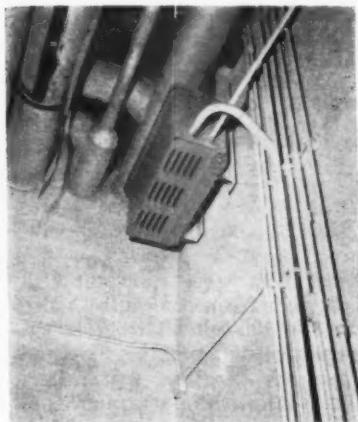
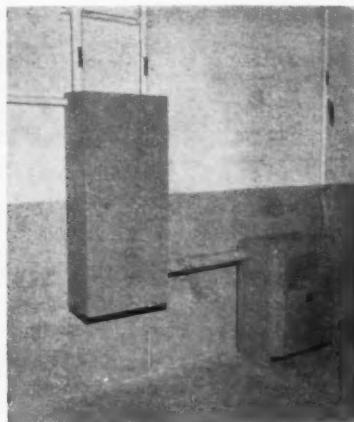


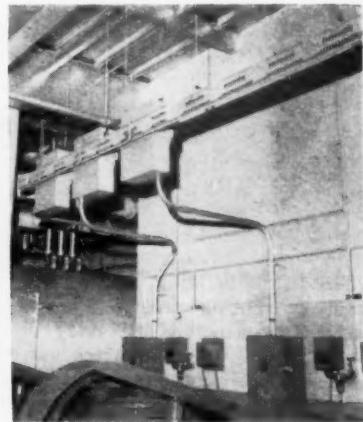
FIG. 2—Secondary distribution from unit substations is basically 480-volt, 3-pole, plug-in bus duct. Lighting is served from duct through air-cooled transformers.



LIGHTING TRANSFORMERS like this 30-kva, 3-phase unit provide 120/208-volt, 3-phase, 4-wire service to adjacent lighting panels.



75-KVA TRANSFORMER in boiler room feeds 4-wire 120/208-volt distribution cabinet serving four lighting panels in that specific plant area.



125-HP AIR compressors in boiler room are fed from 800-amp, 480-volt plug-in bus duct run; also two power panels in injection molding area.

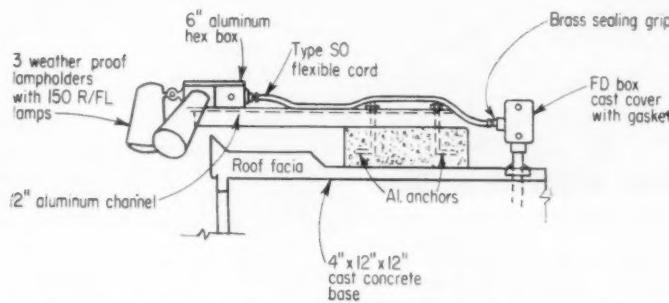
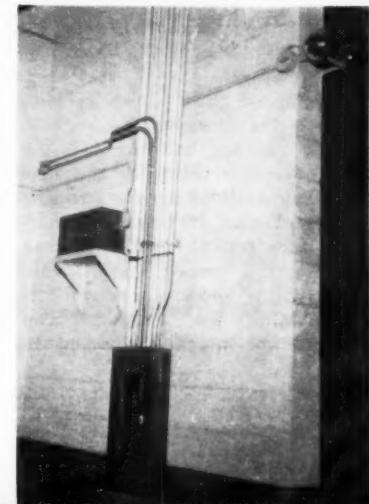
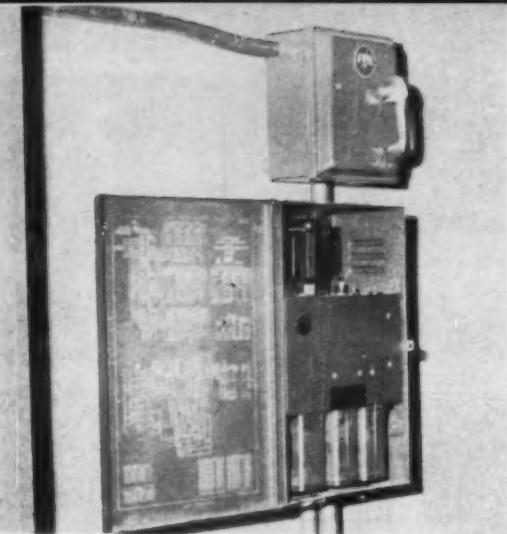


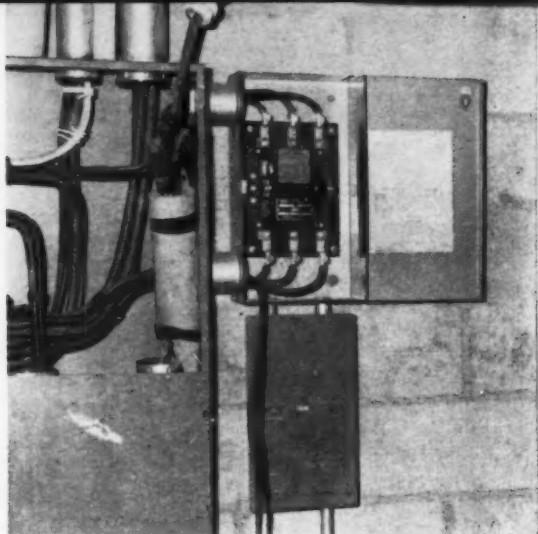
FIG. 3—Mounting method for 3-lamp clusters of 150 R/FL lamps on roof for building perimeter protective lighting.



EMERGENCY LIGHTING is provided by automatically - charged battery packs above regular panel. Battery circuits feed remote lighting "heads."



PULSE TRANSMITTER on wall in main switchboard room is supplied at 120 volts by two No. 10's in $\frac{3}{4}$ -in. conduit, through 30-amp, 1-pole fused switch, from panel at left. Outgoing conduits from bottom carry four No. 8's in $1\frac{1}{2}$ -in. conduit to provide pulse injection into 120/208-volt panel board and six No. 14's in 1-in. conduit to connect transmitter to central operations panel.



REMOTE CONTROL switch (mechanically-held contactor) has 3-wire control circuit to its coil. Dual coded relay (below open switch enclosure) actuates either OPEN or CLOSE circuit of switch coil in response to corresponding pre-set pulse code. Switch is 3-pole, controlling 3-phase, 30-amp, 277-volt (phase-to-neutral) lighting circuit home run. Relay requires 120-volt supply circuit for motor and pulse input.

Modern control uses . . .

Automatic Remote Switching

TAKE a bunch of remote control switches (mechanically-held contactors) and locate them, anywhere in the building, in the home runs for lighting circuits. Place a carrier frequency coded relay at each remote control switch, arranged to operate the magnetic coil of the switch. Provide only the normal circuit wiring for the lighting load and for the hookup of the relay to the remote switch. Install a high frequency transmitter and associated program control panel at a central location in the building. Then just set the control panel for programmed operation of the outlying remote control switches. That's automatic remote switching—all with no control wires between the central panel and the individual coded relays.

Typical of the above system, which is finding expanding application in modern buildings, is the remote control setup at the new American Airlines hangar building at New York's International Airport. Here, remote control switches are used to control obstruction, sign, parking and apron area lighting outside the hangar. The switches are installed adjacent to

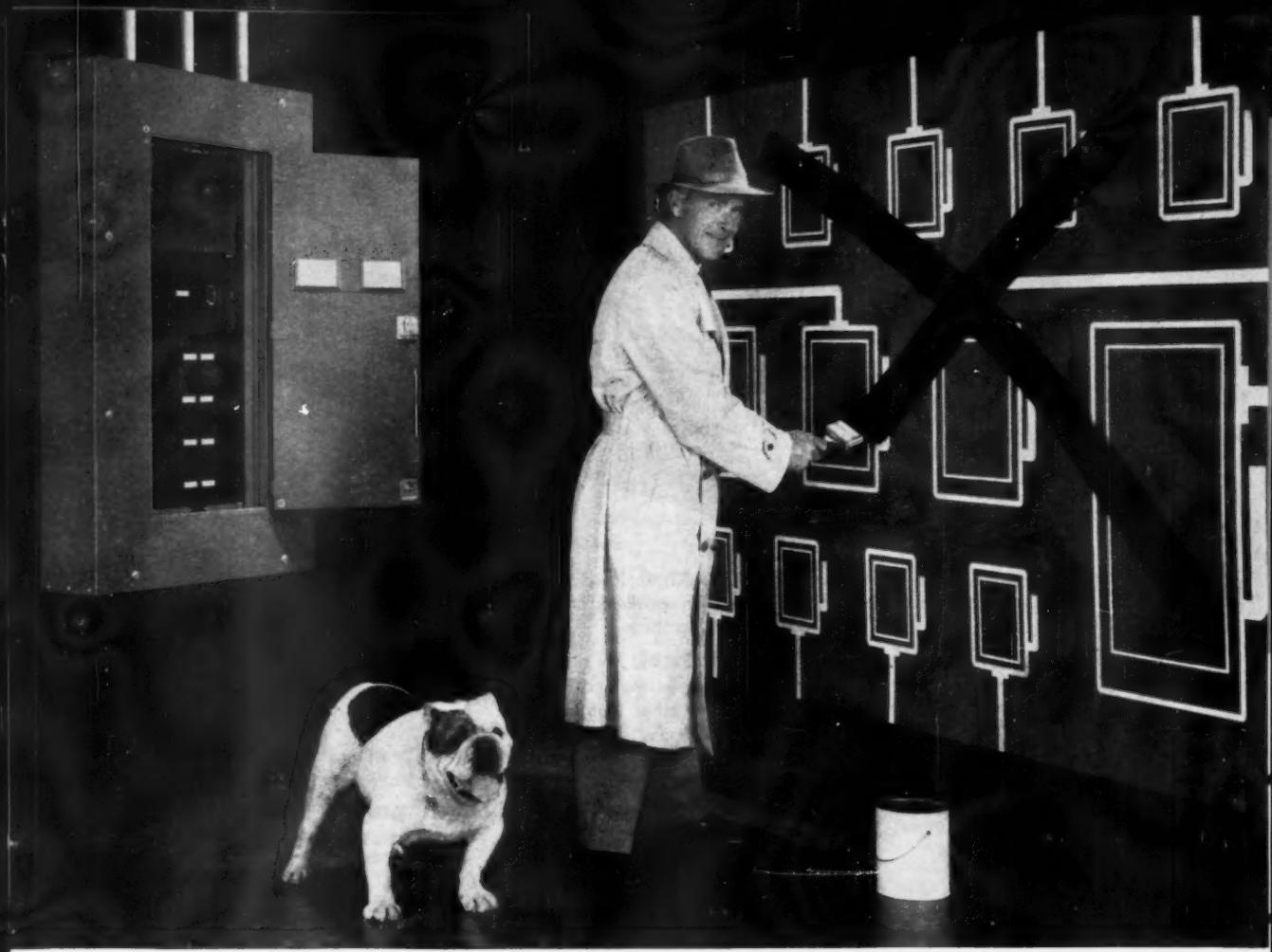
lighting panelboards in which the circuits originate and are protected. They are used on both 120-volt and 277-volt 3-pole circuits and are operated through coded relays actuated by the electronic IBM time system.



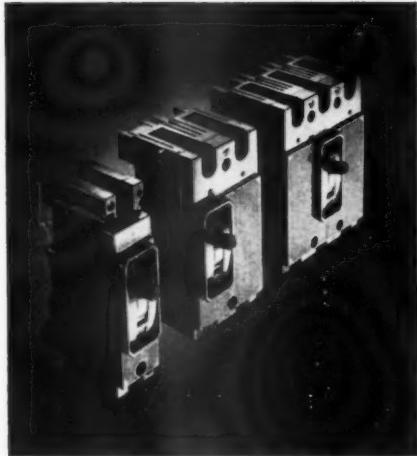
CENTRAL OPERATIONS panel at control center in building houses master clock and program machines to control transmitter output to provide signal command pulses of proper time code for operation of various dual coded relays throughout the building.

The carrier frequency control system is built around a transmitter mounted in the main switchboard room. This transmitter injects high frequency control pulses into the 120-volt distribution system supplied from the building's emergency lighting transformer. Signal injection is programmed by a central control panel installed in a nearby control room. The signal pulses are coupled to the 120/208-volt emergency lighting panel through capacitors which isolate the transmitter from the 60-cycle energy of the distribution system. No control wiring is used between the transmitter and the coded relays which sense the high frequency pulses and actuate the remote control switches.

Each coded relay contains a small 120-volt motor-operated decoding mechanism. The circuit that supplies energy to this motor also carries signal pulses which initiate operation of the motor. The decoding mechanism in each relay assembly is set to respond to particular, timed ON and OFF pulses, to operate the separate OPEN and CLOSE circuits of the mechanically-held remote control switch.



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I-T-E molded case type "ET" circuit breakers in BullDog power panels become the nerve center of commercial and industrial buildings. They cover a range of needs from the 100-amp "E" frame 1, 2 and 3 pole breakers to 600-amp "LM" frame 2 and 3 pole breakers.

Here's efficient, space saving circuit control! BullDog power panels with I-T-E molded-case breakers eliminate banks of individual switches . . . concentrate control in a compact, easy-to-install panel. And with bus bar capacity up to 1200 amps, they meet practically every power requirement.

Your clients get two-way protection with I-T-E circuit breakers. Magnetic trip insures split-second protection against shorts—thermal time delay guards against overloads. The breakers provide unsurpassed overcurrent protection with the ability to carry continuous current rating indefinitely. A common tripper bar operates all poles simultaneously on two or three pole devices.

Ask for BullDog power panels with I-T-E molded-case circuit breakers now! See your electrical distributor, BullDog field engineer or write BullDog direct.

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Connection compartment panel removed.

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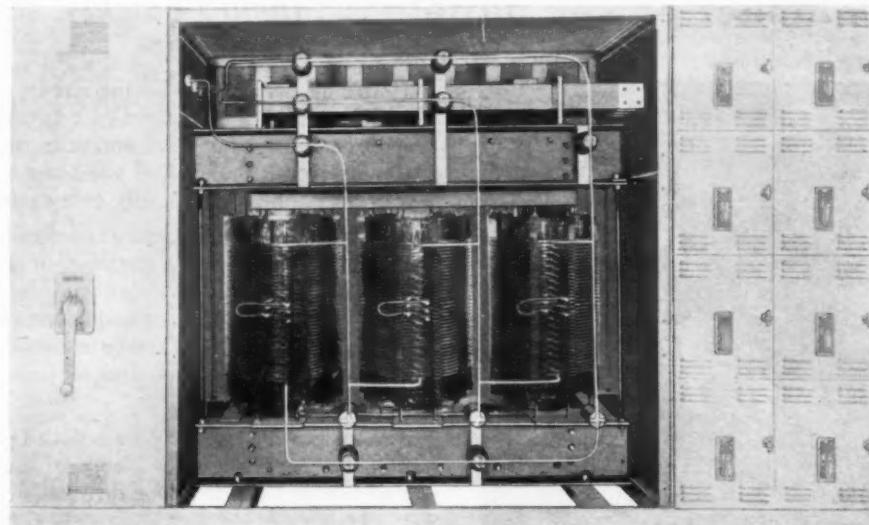
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The same quiet Sorgel transformers, in ALL ratings up to 10,000 Kva and up to 15,000 volts, are also incorporated in substations.

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1000 Kva 13,200 volt Sorgel dry-type transformer in a substation—Compartment panel removed

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Over 40 years' experience in the development, manufacturing and application of transformers

Electrical Construction and Maintenance

New Footcandle Tables

Recently, the Illuminating Engineering Society adopted new—and higher—illumination levels for practical visual tasks. These levels were recommended after a study of the Blackwell Report, which stemmed from an eight-year project at the University of Michigan's Vision Research Laboratories. The results of this study, headed by Dr. Richard H. Blackwell, director of the Michigan laboratories, revealed the necessity for higher lighting intensities. The study has been supported since 1950 by the Illuminating Engineering Research Institute, an independent research body of IES. These new tables should be valuable in aiding you in making more adequate recommendations for lighting to your customers. We believe that this new partial list of lighting levels is so useable that it has been printed in a tear-out form for convenience to you. All figures used at the right of each column are the currently recommended footcandle levels.

INDUSTRIAL AREAS

AIRPLANE MANUFACTURING

Stock parts:

Production	100
Inspection	200**

Parts manufacturing:

Drilling, riveting, screw fastening	70
Spray booths	100
Sheet aluminum layout and template work; shaping and smoothing of small parts for fuselage; wing sections, cowling, etc.	100
Wing sections, cowling, etc.	100

Welding:

General illumination	50
Supplementary illumination	1000
Subassembly: Landing gear, fuselage, wing sections, cowling and other large units	100

Final assembly:

Placing of motors, propellers, wing sections and landing gear	100
Inspection of assembled ship and its equipment	100
Machine tool repairs	100

AIRPLANE HANGARS

Repair service only

ASSEMBLY

Rough easy seeing	30
Rough difficult seeing	50
Medium	100
Fine	500
Extra Fine	1000

AUTOMOBILE MANUFACTURING

Frame assembly	50
Chassis assembly line	100
Final assembly and inspection line	200**

Body manufacturing:

Parts	70
Assembly	100
Finishing and inspecting	200**

BAKERIES

Mixing room	50
Face of shelves (vertical illumination)	30
Inside of mixing bowl (vertical	

mixers)	50
Fermentation room	30
Make-up room:	
Bread	30
Sweet yeast raised products	50
Proofing Room	30
Oven room	30
Fillings and other ingredients	50

Decorating and icing:

Mechanical	50
Hand	100
Scales and thermometers	50
Wrapping room	30

BOOK BINDING

Folding, assembly, pasting, etc.	70
Cutting, punching and stitching	70
Embossing and inspection	200**

BREWERIES

Brew house	30
Boiling and keg washing	30
Filling (bottles, cans, kegs)	50

CANDY MAKING

Box department	50
Chocolate department:	

Husking, winnowing, fat extraction, crushing and refining, feeding	50
Bean cleaning and sorting, dipping, packing, wrapping	50
Milling	100
Cream making:	

Mixing, cooking and molding	50
Gum drops and jellied forms	50
Hand decorating	100
Hard candy:	

Mixing, cooking and molding	50
Die cutting and sorting	100
Kiss making and wrapping	100
CANNING AND PRESERVING	

Initial grading raw material samples	50
Tomatoes	100
Color grading (cutting rooms)	200**

Preparation:

Preliminary sorting: Apricots and peaches	50
Tomatoes	100
Olives	150
CHEMICAL WORKS	

Cutting and pitting	
Final sorting	
Canning:	
Continuous belt canning	
Sink canning	
Hand packing	
Olives	
Examination of canned samples	
Container handling:	
Inspection	
Can unscramblers	
Labeling and cartoning	

CHEMICAL WORKS

Hand furnaces, boiling tanks, stationary driers, stationary and gravity crystallizers	
Mechanical furnaces, generators and stills, mechanical driers, evaporators, filtration, mechanical crystallizers, bleaching	
Tanks for cooking, extractors, percolators, nitrators, electrolytic cells	
CLAY PRODUCTS AND CEMENTS	

CLAY PRODUCTS AND CEMENTS

Grinding, filter presses, kiln room	
Molding, pressing, cleaning and trimming	
Enameling	
Color and glazing—rough work	
Color and glazing—fine work	

CLEANING AND PRESSING INDUSTRY

Checking and sorting	
Dry and wet cleaning and steaming	
Inspection and spotting	
Pressing:	
Machine	
Hand	
Repair and alteration	

CLOTH PRODUCTS

Cloth Inspection	
Cutting	
Sewing	
Pressing	

COAL TIPPLES AND CLEANING PLANTS

Breaking, screening and cleaning areas	
Picking	

DAIRY PRODUCTS

Fluid milk industry:	
Boiler room	
Bottle storage	
Bottle sorting	
Bottle washers	
Can washers	
Cooling equipment	
Filling: inspection	
Gages	(on face)
Laboratories	
Meter panels	(on face)
Pasteurizers	
Separators	
Storage refrigerator	
Tanks, vats: Light interiors	
Dark interiors	
Thermometer	(on face)
Weighing room	
Scales	

EXPLOSIVES

Hand furnaces, boiling tanks, stationary driers, stationary and gravity crystallizers	
Mechanical furnaces, generators and stills, mechanical driers, evaporators, filtration, mechanical crystallizers	
Tanks for cooking, extractors, percolators, nitrators, electrolytic cells	
ELECTRICAL EQUIPMENT MANUFACTURING	
Impregnating	
Insulating: coil winding	
Testing	

100	Tanks for cooking, extractors, per-	
100	colators, nitrators	30
g	EXTERIOR AREAS	
100	Entrances:	
50	Active (pedestrian and/or con-	
samples	veyance)	5.0
200**	Inactive (normally locked, infre-	
200**	quently used)	1.0
70	Vital locations or structures	5.0
30	Building surrounds	1.0
tanks, sta-	Active shipping area surrounds	5.0
y and grav-	Storage areas—active	20
generators	Storage areas—inactive	1
driers, evap-	Loading and unloading platforms	20
mechanical		
actors, per-	FLOUR MILLS	
pyrolytic cells	Rolling	50
D	Sifting	50
kiln rooms	Purifying	50
anizing and	Packing	30
30	Product control	100
high work	Cleaning screens, man lifts, aisle-	
the work	ways and walkways, bin checking	30
ESSING		
50	FORGE SHOPS	50
50	FOUNDRIES	
300**	Annealing (furnaces)	30
100	Cleaning	30
100	Core making (fine)	100
300**	Core making (medium)	50
50	Grinding and chipping	100**
50	Inspection (fine)	500**
50	Inspection (medium)	100
50	Moulding (medium)	100
50	Moulding (large)	50
500**	Pouring	50
150	Sorting	50
150	Cupola	20
200**	Shakeout	30
GARAGES—AUTOMOBILE AND		
TRUCK	Service garages:	
2000**	Repairs	100
300**	Active traffic areas	20
500**	Parking garages:	
300**	Entrance	50
LEANING	Traffic lanes	10
d cleaning	Storage	5
10	GLASS WORKS	
300**	Mix and furnace rooms, pressing	
30	and lehr, glass blowing machines	30
30	Grinding, cutting glass to size,	
50	silvering	50
—	Fine grinding, polishing, beveling	100
(on face)	Inspection, etching and decorating	200**
(on face)	GLOVE MANUFACTURING	
50	Pressing	300**
100	Knitting	100
50	Sorting	100
100	Cutting	300**
50	Sewing and inspection	500**
(on face)	HAT MANUFACTURING	
30	Dyeing, stiffening, braiding, clean-	
30	ing and refining	100
30	Forming, sizing, pouncing, flang-	
20	ing, finishing and ironing	200**
100	Sewing	500**
(on face)	INSPECTION	
50	Ordinary	50
30	Difficult	100
70	Highly difficult	200**
ENT	Very difficult	500**
50	Most difficult	1000**
3	IRON AND STEEL MANUFAC-	
turing	Open hearth:	
100	Stock yard	10
100	Charging floor	20
tanks, sta-	Pouring slide:	
y and grav-	Slag pits	20
generators	Control platforms	30
driers, evap-	Mold yard	5
mechanical	Hot top	30
	HOT TOP STORAGE	
	Checker cellar	10
	Buggy and door repair	30
	Stripping yard	20
	Scrap stockyard	10
	Mixer building	30
	Calcining building	10
	Skull cracker	10
	Cinder dump	0.1
	ROLLING MILLS:	
	Blooming, slabbing, hot strip, hot	
	sheet	30
	Cold strip, plate	30
	Pipe, rod, tube, wire drawing	50
	Merchant and sheared plate	30
	TIN PLATE MILLS:	
	Tinning and galvanizing	50
	Cold strip rolling	50
	Motor room, machine room	30
	INSPECTION:	
	Blackplate, bloom, billet chipping	100
	Timplate, other bright surfaces	100†
	LAUNDRIES	
	Washing	30
	Flatwork ironing, weighing, listing	
	and marking	50
	Machine and press finishing, sort-	
	ing	70
	Fine hand ironing	100
	LEATHER MANUFACTURING	
	Cleaning, tanning and stretching,	
	vats	30
	Cutting, fleshing and stuffing	50
	Finishing and scarffing	100
	LEATHER WORKING	
	Pressing, winding and glazing	200
	Grading, matching, cutting, scarf-	
	ing, sewing	300
	LOCKER ROOMS	20
	MACHINE SHOPS	
	Rough bench and machine work	
	Medium bench and machine work,	
	ordinary automatic machines,	
	rough grinding, medium buffing	
	and polishing	50
	Fine bench and machine work,	
	fine automatic machines, medium	
	grinding, fine buffing and polish-	
	ing	100
	Extra fine bench and machine	
	work, grinding—fine work	500**
	500**	1000**
	MATERIALS HANDLING	
	Wrapping, packing, labeling	50
	Picking stock, classifying	30
	Loading, trucking	20
	Inside truck bodies and freight	
	cars	10
	MEAT PACKING	
	Slaughtering	30
	Cleaning, cutting, cooking, grind-	
	ing, canning, packing	100
	PACKING AND BOXING (SEE	
	MATERIALS HANDLING)	
	PAINT MANUFACTURING	
	General	30
	Comparing mix and standard (see	
	Color Matching)	200†
	PAINT SHOPS	
	Dipping, simple spraying, firing	
	Rubbing, ordinary hand painting	
	and finishing art, stencil and	
	special spraying	50
	Fine hand painting and finishing	
	Extra fine hand painting and finish-	
	ing (automobile bodies, piano	
	cases, etc.)	100
	300**	300**
	PAPER BOX MANUFACTURING	
	General manufacturing area	50
	PAPER MANUFACTURING	
	Beaters, grinding, calendering	30
	FINISHING, CUTTING, TRIMMING, PAPER-	
	MAKING MACHINES	50
	Hand counting, wet end of paper	
	machine	70
	Paper machine reel, paper inspec-	
	tion and laboratories	100
	Rewinder	150
	PLATING	30
	POLISHING—BURNISHING	100
	PRINTING INDUSTRIES	
	Type foundries:	
	Matrix making, dressing type	100
	Font assembly—sorting	50
	Hand casting	50
	Machining casting	50
	Printing plants:	
	Color inspection and appraisal	200**
	Machining composition	100
	Composing room	100
	Presses	70
	Imposing stones	150
	Proof reading	150
	Electrotyping:	
	Molding, finishing, leveling molds,	
	routing, trimming	100
	Blocking, tinning	50
	Electroplating, washing, backing	50
	Photo engraving:	
	Etching, staging	50
	Blocking	50
	Routing, finishing, proofing	100
	Tint laying	100
	Masking	100
	RECEIVING AND SHIPPING	
	(SEE MATERIALS HANDLING)	
	RUBBER TIRE AND TUBE	
	MANUFACTURING	
	Stock preparation:	
	Banbury, plasticating, milling	30
	Calendering	50
	Fabric preparation:	
	Stock cutting, bead building	50
	Tube tubing machines	50
	Tread tubing machines	50
	Tire building:	
	Solid tire	30
	Pneumatic tire	50
	Curing department:	
	Tube curing, casing curing	70
	Final inspection:	
	Tube, casing	200**
	Wrapping	50
	RUBBER GOODS—MECHANI-	
	CAL	
	Stock preparation:	
	Plasticating, milling, banbury	30
	Calendering	50
	Fabric preparation:	
	Stock cutting, hose looms	50
	Molded products and curing	50
	Extruded products	50
	Inspection	200**
	SHEET METAL WORKS	
	Miscellaneous machines, ordinary	
	bench work	50
	Presses, shears, stamps, spinning,	
	medium bench work	50
	Punches	50
	Tin plate inspection, galvanized	200++
	Scribing	200++
	SHIP YARDS	
	General	5
	Ways	10
	Fabrication areas	30
	SHOE MANUFACTURING	
	(LEATHER)	
	Cutting and stitching:	
	Cutting tables	300**
	Marking, buttonholing, skiving,	
	sorting, vamping and counting	300**

New Tables (cont.)

Stitching:	
Dark materials	300**
Making and finishing:	
Nailers, sole layers, welt beaters and scarfers, trimmers, welters, lasters, edge setters, slingers, randers, wheelers, treers, cleaning, spraying, buffing, polishing, embossing	200
SHOE MANUFACTURING (RUBBER)	
Washing, coating, mill run compounding	30
Varnishing, vulcanizing, calendering, upper and sole cutting	50
Sole rolling, lining, making and finishing processes	100
SOAP MANUFACTURING	
Kettle houses, cutting, soap chip and powder	30
Stamping, wrapping and packing, filling and packing soap powder	50
STAIRWAYS, WASHROOMS AND OTHER SERVICE AREAS	20
STONE CRUSHING AND SCREENING	
Belt conveyor tubes, main line shafting spaces, chute rooms inside of bins	10
Primary breaker room, auxiliary breakers under bins	10
Screens	20
STORAGE ROOMS OR Warehouses	
Inactive	5
Active:	
Rough bulky	10
Medium	20
Fine	50
STRUCTURAL STEEL FABRICATION	50
SUGAR REFINING	
Grading	50
Color inspection	200
TESTING	
General	50
Extra fine instruments, scales, etc.	200**
TEXTILE MILLS (COTTON)	
Opening, mixing, picking	30
Carding and drawing	50
Stubbing, roving, spinning, spooling	50
Beaming and slashing on comb:	
Grey goods	50
Denims	50
Inspection:	
Grey goods (hand turning)	100
Denims (rapidly moving)	500**
Automatic tying-in	150**
Drawing-in by hand	200**
Weaving	100
TEXTILE MILLS (SILK AND SYNTHETICS)	
Manufacturing:	
Soaking, fugitive tinting, conditioning or setting of twist	30
Winding, twisting, rewinding, and coning, quilling, slashing:	
Light thread	50
Dark thread	200
Warping (silk or cotton system) on creel, on running ends, on reel on beam, on warp at beaming	100
Drawing-in:	
On heddles	200**
On reed	200**
Weaving	100

TEXTILE MILLS (WOOLEN AND WORSTED)

Opening, blending, picking	30
Grading	100**
Carding, combining, recombing, gilling	50
Drawing (white)	50
Drawing (colored)	100
Spinning (frame) (white)	50
Spinning (frame) (colored)	100
Spinning (mule) (white)	50
Spinning (mule) (colored)	100
Twisting (white)	50
Winding (white)	30
Winding (colored)	50
Warping (white)	50
Warping (white) (at reed)	100
Warping (colored)	100
Warping (colored) (at reed)	300**
Weaving (white)	100
Weaving (colored)	200
Grey goods room:	
Burling	150**
Sewing	300**
Folding	70
Wet finishing:	
Fulling	50
Scouring	50
Crabbing	50
Drying	50
Dyeing	100**
Dry finishing:	
Naping	70
Shearing	100**
Conditioning	70
Pressing	70
Inspecting (perching)	2000**
Folding	70

TOBACCO PRODUCTS	
Drying, stripping, general	30
Grading and sorting	200**
UPHOLSTERING—AUTOMOBILE, COACH	
Furniture	100
WAREHOUSE (SEE STORAGE)	
WELDING	
General illumination	50
Precision manual arc welding	1000**
WOODWORKING	
Rough sawing and bench work	30
Sizing, planing, rough sanding, medium machine and bench work, gluing, veneering, cooperage	50
Fine bench and machine work, fine sanding and finishing	100

Notes on Industrial Areas

*Minimum on the task at any time.
**Obtained with a combination of general lighting plus specialized supplementary lighting. Care should be taken to keep within the recommended brightness ratios. These seeing tasks generally involve the discrimination of fine detail for long periods of time and under conditions of poor contrast. To provide the required illumination, a combination of the general lighting indicated plus specialized supplementary lighting is necessary. The design and installation of the combination system must not only provide a sufficient amount of light, but also the proper direction of light, diffusion, and eye protection. As far as possible it should eliminate direct and reflected glare as well as objectionable shadows.

†The specular surface of the material may necessitate special consideration in selection and placement of lighting equipment, or orientation of the work.

††Special lighting such that (1) the luminous area shall be large enough to cover the surface which is being inspected and (2) the brightness be within the limits necessary to obtain comfortable contrast conditions. This involves the use of sources of large area and relatively low brightness in which the source brightness is the principal factor rather than the footcandles produced at a given point.

INSTITUTIONS

ART GALLERIES	
General	30
On paintings (supplementary)	30
On statuary and other displays	100
(1) Dark paintings with fine detail should have 2 to 3 times higher illumination.	
(2) In some cases, much more than 100 foot-candles is necessary to bring out the beauty of statuary.	
HOSPITALS	
Anesthetizing and preparation room	30
Auditorium:	
Assembly	15
Exhibition	30
Autopsy and morgue:	
Autopsy room	100
Autopsy table	2500
Morgue, general	20
Central sterile supply:	
General	30
Needle sharpening	150
Corridor:	
General	10
Operating and delivery suites and laboratories	20
Cystoscopic room:	
General	100
Cystoscopic table	2500
Dental suite:	
Waiting room:	
General	15
Reading	30
Operatory, general	70
Instrument cabinet	150
Dental chair	1000
Laboratory, bench	100
Recovery room	5
Dining room (see Restaurants)	
Electroencephalographic suite:	
Office	100
Workroom	30
Patients' room	30
Emergency room:	
General	100
Local	2000
EKG, BMR and Specimen room:	
General	20
Specimen table (supplementary)	50
Examination and treatment room:	
General	50
Examining table	100
Eye, ear, nose and throat suite:	
Dark room	10
Eye examination and treatment room	20
Ear, nose and throat room	20
Exits, at floor	5
Flower room	10
Formula room	30
Fracture room:	
General	50
Fracture table	200
Kitchen:	
Central	70
Floor, kitchen and pantry	70
Dishwashing	30
Laboratories:	
Assay rooms	30
Work tables	50
Close work	100
Laundry:	
General	30
Pressers and ironers	70
Sorting	70
Libraries	70
Linen closet	10
Locker rooms	20
Lobby	30
Lounge rooms	30
Maintenance shop:	
General	30
Work benches	100

Paint storage	10	Make-up†‡	30	rooms	30
Medical records room	100	General	10	Corridors, elevators, escalators, stairways	20
Nurses' station:		Corridors, elevators and stairs	20	BANKS:	
General	20	Dining areas (see Restaurants)		Lobby:	
Desk and charts	50	Entrance foyer	30	General	50
Medicine room counter	100	Front office	50	Writing areas	70
Nurses' workroom	30	Kitchen (see Restaurants)		Tellers' stations	150
Nurseries:		Laundry:		Posting and keypunch	150
General	10	Washing	30	Regular office work	100
Examination table	70	Flat work ironing	50	DEPOTS, TERMINALS AND STATIONS	
Play room, pediatric	30	Machine and press finishing	70	Waiting room	30
Obstetrical:		Linen room:		Ticket offices:	
Clean-up room	30	Sewing	100	General	100
Scrub-up room	30	General	20	Ticket rack and counters	100
Labor room	20	Lobby:		Rest room and smoking room	30
Delivery room, general	100	General lighting	10	Baggage checking	50
Delivery table	2500	Reading and working areas	30	Storage	20
Offices (See Offices)		Marque:		Concourse	10
Parking lot	5	Dark surroundings	30	Platforms	20
Power plant:		Bright surroundings	50	Toilets and washrooms	30
Boiler room	10	Offices:		Drafting rooms (see Offices)	
Machine room	20	Accounting	150	MUNICIPAL BUILDINGS (FIRE AND POLICE)	
Switchboard room	30	General	100	Office work, corridors, elevators, stairways, washrooms (see Offices)	
Transformer room	10	Reception	30	Police:	
Pharmacy:		Power plant:		Identification records	150
General	30	Boiler room	10	Jail cells and interrogation rooms	30
Work table	100	Equipment room	20	Fire Hall:	
Active storage	30	Storerooms	10	Dormitory	20
Alcohol vault	10	Work shops (See Machine Shops and Woodworking, under Industrial Areas Section)			
Private rooms and wards:		Museums (See Art Galleries)			
General	10	Professional Offices (See Hospitals)			
Reading	30	Restaurants, lunch rooms, cafeterias			
Psychiatric disturbed patients' areas	10	Dining areas:			
Radioisotope facilities:		Cashier	50		
Radiochemical laboratory	30	Intimate type:			
Up-take measuring room	20	Light environment	10		
Examination table	50	Subdued environment	3		
Retiring room	10	For cleaning	20		
Sewing room:		Leisure type:			
General	20	Light environment	30		
Work area	100	Subdued environment	15		
Solariums	20	Quick service type:			
Stairways	20	Bright surroundings†‡	100		
Storage, central:		Normal surroundings†‡	50		
General	15	Food displays—twice the general levels but not under	50		
Office	70	Kitchen, commercial:			
Surgery:		Inspection, checking and pricing	70		
Instrument and sterile supply room	30	Other areas	30		
Clean-up room (instruments)	100	*Minimum on the task at all times.			
Scrub-up room	30	**Pencil handwriting, reading of reproductions and poor copies require 70 footcandles.			
Operating room, general	100	This may be done in the bathrooms but if a dressing table is provided local lighting should provide the level recommended.			
Operating table	2500	††Including street and nearby establishments.			
Recovery room	30	†For close inspection, 50 footcandles			
Therapy:		OFFICES			
Physical	20	OFFICES			
Occupational	30	Cartography, designing, detailed drafting	200		
Toilets	10	Accounting, auditing, tabulating, bookkeeping, business machine operation, reading poor reproductions, rough layout drafting	150		
Utility room	20	Regular office work, reading good reproductions, reading or transcribing handwriting in hard pencil or on poor paper, active filing, index references, mail sorting	100		
Waiting room:		Reading or transcribing handwriting in ink or medium pencil on good quality paper, intermittent filing	70		
General	15	Reading high contrast or well-printed material, tasks and areas not involving critical or prolonged seeing such as conferring, interviewing, inactive files and wash-			
Reading	30	ing			
X-ray room and facilities:		Reading high contrast or well-printed material, tasks and areas not involving critical or prolonged seeing such as conferring, interviewing, inactive files and wash-			
Radiography and fluoroscopy	10	ing			
Deep and superficial therapy	10	(1) Above values are illumination on merchandise on display or being appraised. The plane in which lighting is important may vary from horizontal to vertical.			
Darkroom	10	(2) Specific appraisal areas involving difficult seeing may be lighted to substantially high levels.			
Waiting room, general	15	(3) Color rendition of fluorescent lamps is important. Incandescent and fluorescent usually are combined for best appearance merchandise.			
Waiting room, reading	30	(4) Illumination may often be made more uniform to tie in with merchandising layout.			
Viewing room	30				
Filing room, developed films	30				
Storage, undeveloped films	10				
HOTELS					
Auditoriums:					
Assembly only	15				
Exhibitions	30				
Dancing	5				
Bars and cocktail lounges (see Restaurants)					
Bathrooms:					
Mirror†	30				
General	10				
Bedrooms:					
Reading (books, magazines, newspapers)	30				
Inkwriting**	30				



CROUSE-HINDS

PAGE ONE
OF AN EIGHT PAGE SECTION

Guide to **SPECIAL PURPOSE** Lighting



● EXPLOSION-PROOF

● DUST-IGNITION-PROOF

● ENCLOSED & GASKETED
TYPE EG (Vaportight)

● FLOODLIGHTING

● UNDERWATER

NEW

Type **EVA**
Explosion-Proof
Mercury Vapor
Lighting Fixture

and Other Industrial,
Commercial and
Public Applications



Type EV Explosion-Proof Lighting Fixtures in a painting department.



Type EV Lighting Fixture with dome reflector

NEW
TYPE EVA
Explosion-Proof
MERCURY VAPOR →
Lighting Fixtures

For dependable security at low operating cost in hazardous locations.

- 7 times longer life!
- 2.5 times more light!

As with all Crouse-Hinds explosion-proof devices, these new EVA Mercury Vapor Lighting Fixtures are heavily constructed to withstand the pressure of internal explosions without rupturing. Gas tightness is not a requirement for safer performance. Flame-tight joints prevent the escape of flames to flammable atmospheres.

250 Watt—National Electrical Code: Class I, Groups C & D
400 Watt—Class I, Group D



EVA Series Pendent Type

- **Easiest Installation**
- **Easiest Maintenance**
- **Safest Performance**

You get all three with Famous
"EV Series" Explosion-Proof Lighting Fixtures!

Quickest installation . . . quickest relamping . . . more light . . . safer operation! These advantages have made the EV Series the most popular explosion-proof fixtures ever developed. Designed to strict UL requirements, they are approved for every Class I location listed as hazardous under the National Electrical Code . . . *including acetylene and hydrogen areas!* There is an EV to meet your needs exactly: pendent, ceiling, bracket or bulkhead . . . in a wide variety of reflector shapes. Sizes 75W to 500W. Special features available: polished finish, breathers, frosted globes.



EVCX Series Ceiling Type



EVJ Series Bulkhead Type



EVBX Series Bracket Type



EVA Series with prismatic Holophane Reflector

CROUSE-HINDS

EXPLOSION-PROOF LIGHTING FIXTURES

Crouse-Hinds explosion-proof lighting fixtures feature many important benefits: a broad selection, wide enough so you can get approved fixtures of the type you want for any hazardous area. Up-to-date, safe, UL-listed designs. The latest improvements in convenience and efficiency.

Only a sampling of Crouse-Hinds explosion-proof lighting fixtures is shown here. See catalog offer at bottom of page for more information.

There's a Crouse-Hinds Explosion-Proof Lighting Fixture for Your Special Application . . .

The group below illustrates the broad range of special-purpose lighting fixtures available for use in many specific industries. A Crouse-Hinds Field Engineer can help you solve explosion-proof lighting problems.



Type RCDE-8 for flush ceiling mounting.

Type RCDE-8 Explosion-Proof Fixtures*

Especially suited to railroad repair pits as well as floodlighting applications—or for flush mountings in suspended or poured ceilings. Available with various style reflectors and lenses. For 100W to 200W lamps.



Type BKL10 Brew Kettle Light. To be attached directly to tank. *

For Fluorescent Installations, Type EVF Explosion-Proof Lighting Fixture

Installation is unusually simple. Can be mounted end to end to provide continuous, uniform illumination. Relamping is quick and easy—no special tools needed. Ballast housing easily accessible. Available with pendent mounting, straight or at 45°. Sizes and styles to take 1, 2, 3 or 4 lamps, 40W to 100W conventional bipin, rapid start bipin and instant start single-pin slimline types. Also dust-tight.

National Electrical Code: Class I, Groups C & D
Class II, Groups E, F & G



Type RCDE-8 with suspension base.



Type EVPH Pedestal Light for outdoor illumination. *

Type EVO Tank Light for suspension over tank port holes. *



* National Electrical Code: Class I, Group D.

† National Electrical Code: Class I, Groups C & D



Type EVA Cargo Light with guard and reflector. *

Portable Explosion-Proof Hand Lamp

Explosion-proof construction throughout. Thick, impact-resistant globe. 75 or 100W. †



Send for Bulletin Our complete line of lighting equipment is described in this bulletin. It's free. You'll find it a helpful guide in your work.



CROUSE-HINDS



Type DLA Dust-Tight Lighting Fixtures installed in a grain elevator.



Type DLA Dust-Tight Lighting Fixtures installed in an ammonium nitrate plant.

For Complete Safety in Any Dust-Laden Atmosphere:

DL Series DUST-IGNITION-PROOF Lighting Fixtures

Crouse-Hinds Dust-Ignition-Proof Incandescent Lighting Fixtures are designed to exclude dust from the fixture interior, minimize the accumulation of dust on the fixture exterior, and to operate at temperatures below the ignition point of dust. They are easily installed, attractive in appearance, and available in a wide range of types and sizes from 100W to 500W.

For Applications Not Requiring Intense Illumination



Type DLA with guard

Crouse-Hinds fixtures such as Type DLA shown below are recommended for dust-laden locations in which light of high intensity is not essential. While they are lower in cost, they contain all the safety features of the DL Series fixtures at right.

For Applications Where Intense Illumination Is of Prime Importance

These DL fixtures feature an inner reflector and are available with a wide variety of outer lens reflector styles. All are designed to produce a high degree of light intensity. The selection shown is but a fraction of the many mounting types obtainable.



DLB Series, Bracket Type



DLC Series, Ceiling Type, with flat cone reflector.

CROUSE-HINDS

National Electrical Code: Class II, Groups E, F & G



ENCLOSED AND GASKETED (Type EG)

Vaportight Lighting Fixtures

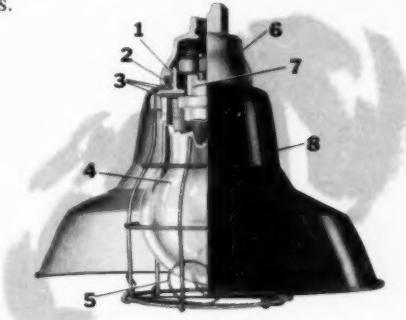
Crouse-Hinds UL Type EG Vaportight Lighting Fixtures are constructed to protect lamp, receptacle and wiring from moisture, gases, vapors, smoke, lint, non-hazardous dust conditions, etc. They are designed for use in exposed, damp or dirty locations such as docks, paper mills, breweries, boiler rooms, round-houses, dairy plants and marine applications.

CROUSE-HINDS VAPORMASTER Lighting Fixtures

Cut relamping costs in half! Adapt for larger lamp size without rewiring! Cleaning and relamping is done in only half the time — without tools! A simple change of adapters accommodates a larger lamp — without touching the wiring.



Vapormaster relamping is amazingly quick and easy.



1. Aluminum adapter-guard assembly fits all Conduit bodies. 2. Stainless steel retaining spring holds reflector. 3. Gaskets make vaportight seal between globe and adapter, reflector and body, adapter and reflector. 4. Pear-shaped globe — lamp cannot strike side of globe. 5. Globe clamping spring — opens for relamping. 6. Conduit body equipped with receptacle base has set screw in hub to lock on conduit. 7. Shock-absorbing receptacle has universal action — absorbs shock from any direction. 8. Porcelain enameled steel reflector.



Photo shows VNF Installation

Receptacle for VNF Quick-Disconnect



DLA Series with Threaded Reflector and Lens Assembly For lamps up to 500W



Type VDA
Screw Guard Style



Type VNF
Quick-
Disconnect
Style

V and VH Series VAPORTIGHT Lighting Fixtures

Constructed of tough, corrosion-resistant cast Feraloy. Simple in design: wiring chamber remains vaportight, even if globe is broken or removed. Use them to protect your lighting in any wet or corrosive locations. Also suitable for Class III locations (ignitable flyings and fibers). Available with clamp or screw guards, in 11 hub arrangements. Pendant, bracket or ceiling styles. Sizes: 50W through 500W.



Type VDB with
Deep Bowl Reflector



Type VUC Vaportight
Decorative Fixture
(Ceiling)

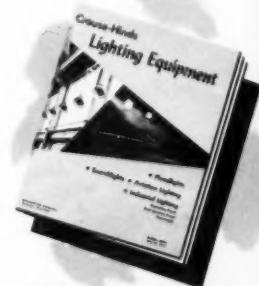
Type VUB Vaportight
Decorative Fixture (Bracket)



Type VS

Portable Vaportight Hand Lamp

Handle and globe holder are one - piece moulded Neoprene. Completely vaportight. Sizes for 75W and 100W lamps.



**Send for your
copy of Lighting
Bulletin # 2697**

CROUSE-HINDS



Mercury Vapor Floodlights

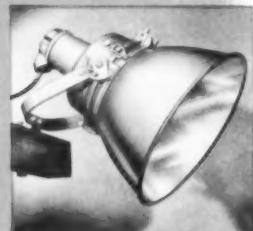
The light output of mercury lamps is more than twice that of large incandescent lamps, and the rated life is seven times as long. The cost of mercury lamps is justified when important factors are long burning hours, labor costs or trouble of relamping. Constant-wattage-type ballasts regulate the lamp current so that light output remains constant even with large variations in line voltage. High-power-factor ballasts are generally preferred since the lower line current may allow a saving in the wiring cost. Crouse-Hinds broad Mercury Vapor line will meet virtually any floodlighting requirement.



Type MVE
Heavy Duty
Mercury Floodlight



Type MVB
General Purpose
Mercury Floodlight



Type MVF Floodlight

Incandescent Searchlights

Crouse-Hinds searchlights in 8, 12, 18, 24 and 36-inch lens sizes and lamp sizes to 5000 watts are available with several different types of bases. Type DCE searchlights are generally used as fixed projectors for spotting distant objects; Type DCY are arranged for direct manual control; and Type DCX are furnished with lever control base for directing from below.

Type DCX-24

CROUSE-HINDS

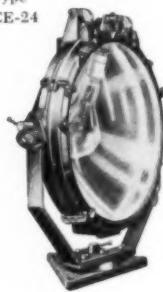
FLOODLIGHTING

From major athletic fields to parking lots, from petroleum refineries to boxing rings, modern Crouse-Hinds Floodlighting turns night into day. With a type and style floodlight to suit every need, Crouse-Hinds will help you put exactly the right amount of light in exactly the right places.

Our Lighting Engineers have the broadest experience in Floodlighting. You can get their assistance by sending a drawing and description of the area you plan to light. We will then submit a complete lighting recommendation, with prices, for your consideration.



Type
LCE-24



Heavy Duty Floodlights

Constructed of cast aluminum alloy to withstand rough, rugged duty. They are highly efficient and are available in 12", 14", 16", 20" and 24" lens diameters, from 200W to 2000W lamp sizes. Reflectors and lenses can be varied to provide narrow or wide beams, diffused, concentrated or colored light — or any other combination needed.



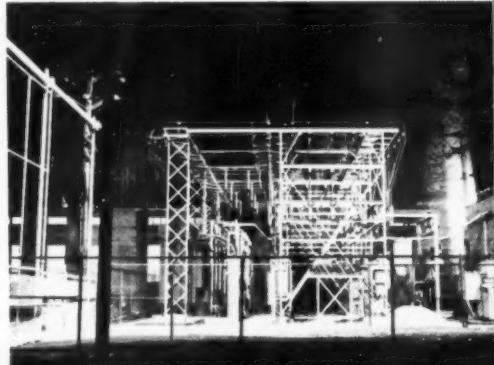
Type SPS



Type RPS

Floodlights for Underwater Use

Crouse-Hinds Underwater Floodlights are of the dry niche type. Both styles are available with or without tile masks. Type RPS can be relamped from pool edge.





Type FLA

Widely acknowledged as the finest.

TYPE FLA FLOODLIGHT

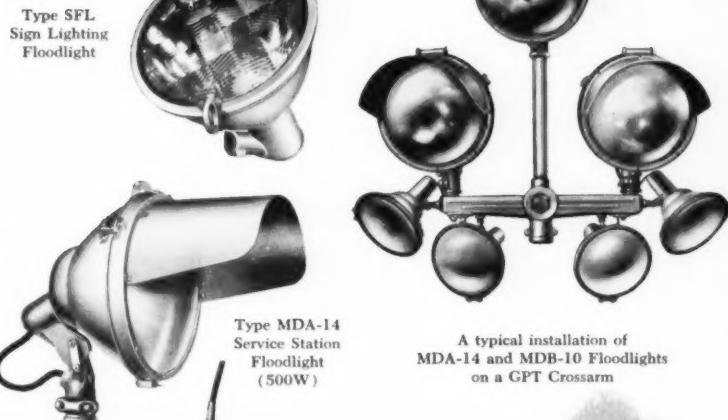
Especially suited to sportslighting

Easier to install, aim, maintain, relamp. Higher efficiency. Permanently weathertight. Pre-wired. Corrosion-resistant. Heat-tempered lens. Available in five beam spreads. Non-tarnishing Alzak reflectors. These are some of the reasons why the FLA is the most popular Floodlight available anywhere. Type FLA has found special favor in sportslighting. Gives more light at lower cost with less maintenance for a longer period. You name the sport and FLA will light it . . . better. Lamp sizes 750W to 1500W. Ask for Sports-lighting bulletin 2605.



For Modern Service Station Lighting

Crouse-Hinds offers several floodlights especially designed for service station use. No matter what the lighting problem — driveways, signs or buildings — you'll find Crouse-Hinds equipment to do the job. The details, plus lighting diagrams, are in Bulletin 2689. Write for a copy.



A typical installation of
MDA-14 and MDB-10 Floodlights
on a GPT Crossarm



Type RCDER-6
Explosion-Proof
portable Floodlight.
Also available for
permanent
installation
RCDE-6). 300W.



Type RLEE
Explosion-Proof
Floodlight. For
heavier-duty
applications.
500W.

Type ADR Portable
Floodlight.
Especially adapted
to emergency
portable use.
250W to 1000W.



Type MDS High
Bay Lighting Fixture
for Incandescent or
Mercury Lamps.
500W to 1500W



Type DIV
Portable
Underwater
Floodlight.
100W - 250W.

Literature Available

We will send you
catalog information
on any Crouse-
Hinds Floodlights.
Simply tell us which
type interests you.



CROUSE-HINDS

CROUSE-HINDS

**the most complete line of
Special Purpose Lighting**

The preceding pages have covered only a part of the wide selection of Crouse-Hinds special-purpose lighting. From the complete line you can fill nearly every special lighting need — even including such unusual items as Explosion-Proof X-ray Film Illuminators or Explosion-Proof Exit Signs. No matter what your lighting problem, chances are you can find the solution in Crouse-Hinds' lighting line.

Type FS
For steps, walkways,
gardens, etc.



Type FCB-12
For marking
obstructions.

A typical Crouse-Hinds decorative display floodlighting installation at the Royal Bank Building, Montreal, Canada.

Type PLB
For fences and other
areas requiring extremely
wide beam.

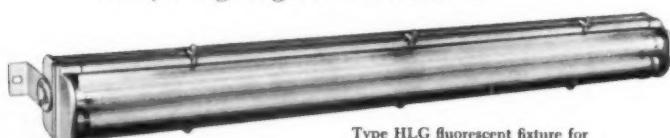


Let Us Help With Your **LIGHTING PROBLEM**

Crouse-Hinds long experience in special-purpose lighting is available to you without charge or obligation. See your Crouse-Hinds distributor. Or contact the nearest Crouse-Hinds office.

Either way, you'll get the information you need, not only on lighting fixtures, but also on the 15,000 switches, plugs and receptacles, motor controls, junctions, conduit fittings, etc., which make up the complete Crouse-Hinds Condulet® line.

*In the meantime, be sure to
send for Lighting Bulletin No. 2697*



Type HLG fluorescent fixture for
underpass or area lighting.

**PAGE EIGHT
OF AN EIGHT PAGE SECTION**



Type GCP-14
Ornamental
floodlights.



Type RCD-8
Flush Mounting in
concrete walls or
floors.



Type RCD-12
Flush mounting in
concrete walls or
floors

CROUSE HINDS

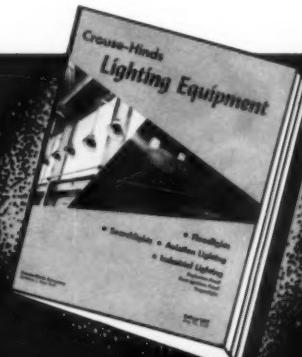
MAIN OFFICE AND FACTORY: SYRACUSE, NEW YORK

Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

Crouse-Hinds Instrument Company, Inc., Silver Spring, Maryland

- CONDULET ELECTRICAL EQUIPMENT (Explosion Proof and Conventional) • FLOODLIGHTING
- TRAFFIC CONTROL SYSTEMS • AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT

These products are sold exclusively through electrical distributors. For application engineering help, contact one of the following offices: Atlanta, Baton Rouge, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Corpus Christi, Dallas, Denver, Detroit, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Ore., St. Louis, St. Paul, Salt Lake City, San Francisco, Seattle, Tulsa, Washington, Resident Representatives: Albany, Baltimore, Charlotte, Chattanooga,戎顿, Pa., Richmond, Va.



Motor Shops

Roll-out Dolly Loads Automatic Burn-out Oven

Reduction of coil-stripping time is one of the operations by which McBroom Electric Co., Indianapolis, Ind., has been progressively increasing its shop efficiency. For years, coil insulation has been charred to facilitate removal of copper from motor slots. First, a hand torch direct flame was used. But this required constant attention and there was always the danger of frame or lamination warping due to hot spots. Then a small burn-out oven of limited capacity was built and used instead of the torch. Now, an additional large, gas-fired automatic oven handles almost any motor that comes into the McBroom shop. A roll-out dolly permits charring batches of small motors or single large motors as required. Automatic heat control, once it is set, releases a mechanic for other shop work.



BURN-OUT OVEN has automatic heat and time control plus roll-out dolly for easy loading and unloading.



RUGGED DOLLY with grooved wheels rides in and out of oven on inverted angle-iron tracks.

The new 7-ft by 7-ft by 7-ft Grant oven permits a saving of from one to three hours on 5 hp and larger motors, and from 15 to 30 minutes on each fractional hp motor. Normal charring time is approximately 1½ hours at a maximum of 700° F. Both heat and time are automatically controlled. With economies like this, management expects the original oven investment to be recovered in about three years.

Oven heat is provided by a long, tubular gas burner centered under the dolly and running the full depth of the oven enclosure. A 24-in. wide steel hood, slanting slightly from center to each side and installed about 10 in. above floor level, shields the full length of the burner from the dolly. This deflects and spreads the heat under the dolly and prevents development of any hot spots under the center of the stators being burned-out. A layer of fire brick covers the oven floor. Forced air circulation through a system of ducts at oven base and roof pro-



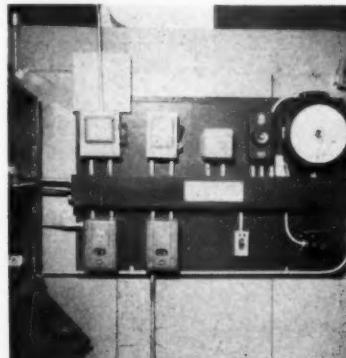
DEFLECTING HOOD over center-line gas burner spreads heat more evenly and prevents hot spots under center of stators. Note track extensions to bring dolly clear of oven doors.

vides adequate ventilation and exhaust facilities. Front access to the oven is through a 6-ft by 4½-ft opening enclosed by two swing-out doors.

The 52-in. by 60-in. roll-out dolly keeps the motors about 16 ins. above floor level. It is constructed of two 4-in. I-beam side channels with a bridging grid of 11 parallel lengths of 2-in. pipe to support the motors. A 4-ft by 5-ft metal pan with a 1½-in. lip rests on top of the pipe grid and catches the charred coil insulation. The dolly frame has four 4-in. diameter grooved wheels which ride on two 1½-in. inverted angle-iron tracks on the oven floor. Track extensions with a simple lip-joint can be added to the oven sections when the dolly is pulled out for loading and unloading under the overhead bridge crane with its electric hoist. When the dolly is in the oven, these extensions must be removed to close the doors.



OVEN INTERIOR showing air circulation ducts, flame deflector hood and firebrick floor lining.

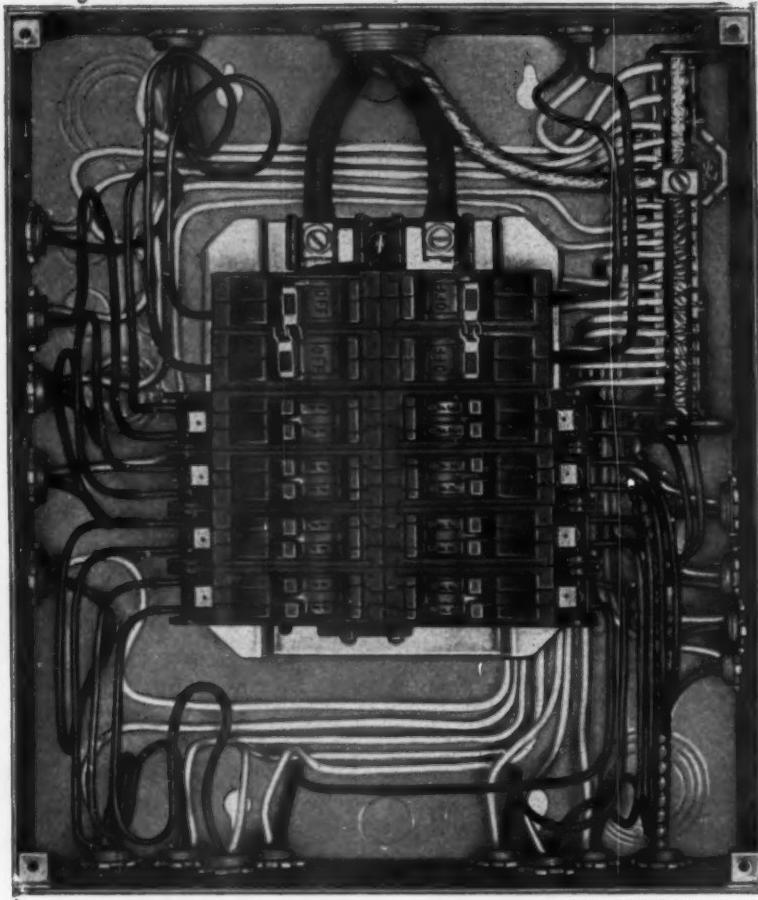


CONTROL PANEL on side of oven provides facilities for automatic control of oven temperature and burn-out time.

Reel Rack Cuts Wire De-icing Time

A free-standing magnet wire reel rack eliminates repetitive set-up time in the coil winding department at Sullivan Electric Co., Cincinnati, Ohio. Reels of the more commonly-used wire sizes are kept in the rack at all times and replaced only when empty or when a special size wire is needed for a specific set of coils. Reels are mounted to and rotate on bracket-supported horizontal axles equipped with rotating disks which permit axial payout without snagging or kinking.

Basic frame for the rack is 72



In this 20-circuit installation

CATALOG NUMBER TRP1210F, S

G.E.'s new "twin" breaker saves you \$11¹⁰!

HERE'S HOW YOU SAVE:

Needed:

- 2 Two-pole breakers
- 16 Single pole breakers
- Total 20 Poles

120/240 VOLTS AC 1Φ, 3W

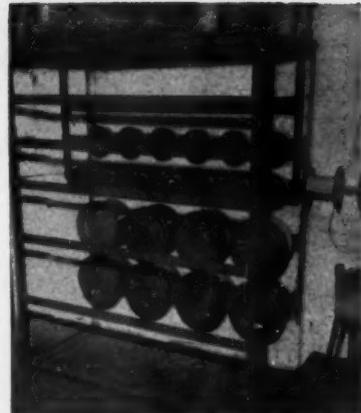
\$79.90*	\$91.00*
G-E "TWIN" WAY	OLD WAY
You save \$11.10*	

*LIST

TRADE MARK

In cost and quality, you win with the "twin"!

GENERAL ELECTRIC



DE-REELING RACK is of free-standing design; accommodates eight 12-in. and 18 6-in. reels of commonly-used magnet wire sizes.



SIDE VIEW of rack shows supplementary guide bars for small reel section. Fiber pads line up with those on front bars.

ins. high, 58 ins. wide, 31 ins. deep; is constructed of 2-in. by 1½-in. angle iron. Parallel cross-pieces of 3-in. channel on the back of the rack support rows of magnet wire reels. The two bottom rows each have four 12-in. diameter reels. Two top rows each accommodate six 6-in. diameter reels. There is space above these for a third row, if needed. Rack capacity totals 26 reels.

Five parallel bars across the front of the rack are made of ¾-in. steel stock, 2-ins. wide. Each bar is in line with the reel axles immediately behind it and functions as a wire payout guide between reel and winding head. The wire passes through holes drilled in the bars. Abrasion protection is provided by ½-in. thick fiber pads covering these openings. The 2½-in. by 1½-in. fiber pads, bolted to the front and back of the bars, have hole diameters matching the wire size, preventing wire from touching metal while

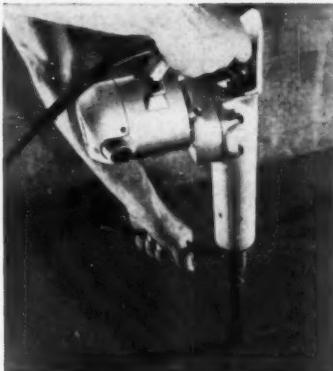
*25 feet of conduit channel
in just 1 hour!*



Look what Black & Decker's 1 1/8" Hammer can do for you!



BREAKING holes through concrete or brick; demolition work goes easier with bull point tool.



INSTALLING electric outlets in concrete is a cinch with a B&D Hammer.

TRIMMING excess metal or scaling after the job's done goes fast and easy with cold chisel.

MOUNTING electric signs, switchgear, etc. is fast work with powerful Hammer and star drill.



2,200 cutting blows a minute
speed up electrical jobs

Here's the tool that helps you slash preparation time laying conduit in concrete floors and in scores of other jobs! Rugged Black & Decker Electric Hammers are power-packed to deliver thousands of hard, rapid, cutting blows to send your man-hours tumbling; output per worker climbing.

See for yourself what the B&D 1 1/8" Hammer can do for you in drilling, digging, piercing, breaking, chiselling and dozens of other operations. Mail coupon for free demonstration or additional information. THE BLACK & DECKER MFG. CO., Dept. 1210, Towson 4, Md. (In Canada: P.O. Box 278, Brockville, Ontario.)



Leading Distributors Everywhere Sell



Black & Decker[®]

Quality Electric Tools . . . Power-built for top performance

→ MAIL TODAY FOR FREE DEMONSTRATION ←

THE BLACK & DECKER MFG. CO., Dept. 1210, Towson 4, Md.

- Please arrange a free demonstration of your 1 1/8" Hammer
 Please send additional literature

Name _____ Title _____

Company _____

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City _____ Zone _____ State _____

the BIG LINE of HEAVY-DUTY EXTENSIONS...



ROYAL
ELECTRIC
"POWR-KORD"

Safe, dependable Royal "Powr-Kords" stand up even under roughest usage because they're built strong to last long. MOLDED-ON caps and connectors with built-in strain reliefs are firmly vulcanized to top quality Royal Types S, SJ, or SJT cord. Heavy brass blades and double-wipe contacts . . . locked in solid rubber or vinyl . . . cannot wobble, work loose, or pull out.

FULLY UL LISTED

Colors . . . black and red rubber, red and yellow vinyl. (Safety engineers recommend yellow — the high-visibility safety color.)

Cord lengths . . . 10' to 100' rubber, 25' to 100' vinyl

Sizes and types

Type SJ	Rubber jacket, sizes 18 and 16 — 2- and 3-Conductor
Type S	Rubber jacket, sizes 18 through 12 — 2-Conductor
Type S	Rubber jacket, sizes 14 and 12 — 3-Conductor
Type SJT	Vinyl jacket, sizes 18 and 16 — 2-Conductor

Order rubber or vinyl "Powr-Kords" from your wholesaler, or write for Catalog No. 3-57, giving wholesaler's name.



CUPPED DISKS cover outer face of reel; rotate on ball-bearing hub; permit axial payout of wire without snagging or kinking. Reels are mounted on stationary spindles. Retaining bolt holds rotating payout disk and reel securely in place.

passing through. A set of supplementary guide bars, mounted to a trapeze frame, are positioned immediately in front of the small reels. Their fiber pads line up with those on the front bars. Wire from the small reels is threaded through both guide bars to eliminate troublesome slack and sag during payout.

Individual reels rest on stationary spindles (of proper diameter) mounted to the 3-in. channel supports. Each spindle has a retaining bolt which also positions a cupped steel disk covering the outer face of the reel. These de-reeling disks rotate freely on a ball-bearing hub with a smooth outer surface and a rolled-edge on the lip extending over the reel periphery. For the 12-in. reels, the disks are approximately 12½ in. in diameter and have a 1½ in. lip. Disks for the 6-in. reels are about 6½ in. in diameter with a ¼-in. lip.

With this rack, wire payout is parallel to the reel axis. As the wire comes off the reel, it passes over the lip of the disk. The disk rotates freely with the turns of wire as they come off the reel, preventing possible snagging on the reel edge or kinking during payout.

CO₂ Fog System Added to Dip Tank

Recent addition of a carbon-dioxide extinguisher system to the varnish dip tank at Scherer Electric Company, Indianapolis, Ind., is another step in management's constant efforts to protect life and property in their motor repair shop.

ROYAL ELECTRIC CORPORATION
an associate of International Telephone and Telegraph Corporation
PAWTUCKET • RHODE ISLAND



**What Sola means by
"conservative design"**

A. L. Myers, Vice President, Manufacturing, discusses the production viewpoint on "conservative design"

"We've found that building mercury lamp transformers 'over spec' actually boosts production"

When one of our constant-wattage mercury lamp transformers leaves the Sola plant, we know for certain that it will do the job for which it was intended. The reason we're so sure of this is that we build every transformer to exceed even Sola's own rigid engineering specifications by an ample margin.

We, in manufacturing, uphold Sola's policy of conservative design by building ballasts "over spec." By using highly-trained people and careful quality con-

trol we can hold our rejects down to practically zero . . . and thus actually boost our net output.

This extra effort on our part means you can count on Sola Transformers to deliver maximum performance consistently over a long period of time. The best way to prove my point is to test a Sola ballast yourself. When you do, I'm sure you'll agree with me that the best way to insure excellent performance of your lighting system is to specify Sola.

Write for your copy of Bulletin 17J-MV-306

Sola Electric Co., 4633 W. 16th St., Chicago 50, Ill., Bishop 2-1414 • Offices in principal cities • In Canada, Sola Electric (Canada) Ltd., 24 Canmet Ave., Toronto 14, Ont.

SOLA



CONSTANT VOLTAGE TRANSFORMERS



REGULATED DC POWER SUPPLIES



MERCURY LAMP TRANSFORMERS



FLUORESCENT LAMP BALLASTS



ROUND ENCLOSED FLOODLIGHTS



**Wide
Application
Increases
Demand**

QUAD Round Enclosed Floodlight Reflectors have a higher reflectance factor with less deterioration of reflector surface.

There are many places where this porcelain enameled unit meets the particular need most effectively. You can sell them enclosed with heat and impact resisting clear glass covers or open with or without detachable wire guard.

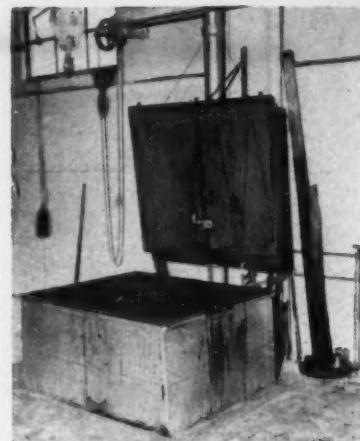
These units have the advantage of multiple mounting and individual light control—features of all QUAD Floodlights. Reflectors for 300—500 watt and 750—1500 watt are both 18 inch diameter but vary in over-all depth.

For complete information on this and other floodlights ask for Catalog 9A

QUADRANGLE MFG. CO.

32 S. PEORIA ST.

CHICAGO 7, ILL.



SEMI-BURIED varnish dip tank in Scherer shop has dual fire protection: (1) carbon dioxide fog spray; and (2) fusible link release of counterweighted tank cover.



THREE FLUSH NOZZLES (arrows) in each of two opposite tank walls spray CO₂ fog blanket over varnish surface to smother flames in case of fire.

operation. Developed by Scherer's Burt Hannewald, the system uses a conventional CO₂ extinguisher, six built-in dip tank nozzles, plus an automatic and emergency manual cable release. It supplements the conventional fusible-link release on the counter weighted dip tank cover and provides a measure of fire control when an obstruction, such as a motor draining over the tank after impregnation, might prevent closing the cover.

The 44-in. by 52-in. by 48-in. (deep) tank is semi-recessed in the shop floor with about 24 ins. extending above the concrete slab. A cylindrical extension some 8 ins. in diameter and 22 ins. in length projects into the ground from the bottom of the tank. This accommodates the shafts of any armatures which might be dipped in the varnish. Normally a round pan covers this tube extension when not in use to prevent accumulation of debris at the base.



The Port of Portland's extreme reliability requirements are met by S&C's Fused Interrupter Metalclad Switchgear with S&C Automatic Transfer Panel and Moto-Draulic Operators

Nation's newest jet-age terminal gets modern S&C Metalclad Switchgear

Extreme reliability of electrical services is a major requirement of the modern jet-age airport, because of the great number of vital radar and lighting needs.

Pacific Power & Light's staff studies showed that this high degree of reliability suggested the use of fused interrupters metal-enclosed, with an integral automatic transfer panel controlling operators for preferred-to-emergency switching. Result: Modern S&C Metalclad Switchgear was specified. The power circuits of this modern new airport are run in conduits or protected cable trays, and so are free from transient faults. The proper protection against the only



8-Bay assembly of S&C Metalclad Switchgear contoured to fit location at Portland International Airport.

Consultant on high-voltage electrical equipment: George A. Drewett, area engineer for Pacific Power & Light Co.

type of fault which is likely to occur—a permanent fault—is the Power Fuse as employed in S&C Switchgear.

To maintain continuity of service, the installation uses S&C Load Interrupters actuated by a Moto-Draulic Operator which is controlled in turn by an S&C Automatic Transfer Panel. This modern equipment meets new, modern standards of reliability, and at the same time saves as much as 50% in capital outlay for switchgear.

For information, write S&C Electric Company, 4433 Ravenswood Ave., Chicago 40, Ill. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.

Specialists in
High-Voltage
Circuit Interruption
for Utilities
Since 1910



METALCLAD SWITCHGEAR



Full skids for easy positioning
Convenient connection locations
Fully removable panels
DB level below NEMA standards
Choice of components

LO-TEMP* **DISTRIBUTION UNI-CENTER**



New Standard DISTRIBUTION UNI-CENTERS combine incoming line, transformer and outgoing feeder in one compact unit. The 112.5 KVA, three phase, 4160 to 280y/120 is just 63½" high, 74" long and 36" deep. The high voltage section is equipped with three 3 KV lightning arresters and gang operated, oil fused cutouts. The low voltage section has 3-pole, thermal magnetic case circuit breakers. The unit is shipped, handled and installed in one piece. The Standard DISTRIBUTION UNI-CENTER is available in any KVA rating and to and including 4800 V.

*Standard LO-TEMP transformers provide extra capacity at no extra cost.

Standard Transformer
 WARREN, OHIO
 "WHEREVER THERE IS POWER"



Phone
2-1563



CO₂ EXTINGUISHER behind dip tank has counterweighted cable release to operate spray valve. When weights drop, cable pulls valve arm down releasing piped carbon dioxide through tank nozzles. Note kick-plate around weights.



MANUAL RELEASE at end of overhead cable permits mechanic to set off fog spray in tank. Two fusible links inserted in cable over tank provides automatic triggering of extinguisher.



Each of the two 44-in. tank sides has three simple nozzles installed flush with the interior tank surface just below the top rim. The center nozzle has three holes to direct a wide-angle spray over the varnish surface. The other two, installed near the corners, have a single hole to direct a spray across the tank width. Since the nozzles are on opposite tank sides, the spray they emit will provide a smothering fog of carbon dioxide over the surface of the varnish in case it becomes ignited.

Metal tubing concealed in the dip-tank walls connect the two sets of flush nozzles with the triggering device on a conventional carbon-dioxide extinguisher set on the floor behind the tank.

The CO₂ spray is set off by a counterweighted flexible steel cable arrangement. The weighted end of the cable is looped around a cylindrical bar extension bolted to the movable lever of the extinguisher valve. Any release of



Tube mill operator here keeps close watch as he adjusts weld heat on control console.

Contractors find:



CIRTUBE* EMT maintains uniform high quality

KNOWING that the EMT you use is always of the same high quality—from tube to tube, bundle to bundle, and month to month—is one sure way to help guarantee better electrical jobs at lower installation costs.

CIRTUBE EMT is like that. Made in a brand new plant, with ultra modern equipment, the latest techniques, and the most stringent quality control measures that experienced engineers can devise, CIRTUBE EMT has already acquired a reputation for unsurpassed uniform quality and workability.

Uniform, high quality is only one of many reasons why CIRTUBE EMT helps get better, more profitable wiring jobs.

Why don't you try CIRTUBE EMT on your next job—you'll like working with it. Now at your Circle wholesaler's.

*Trade Mark



CIRCLE

WIRE & CABLE
a subsidiary of
CERRO DE PASCO
CORPORATION

PLANTS: Maspeth and Hicksville, N. Y. SALES OFFICES & WAREHOUSES: In all principal cities

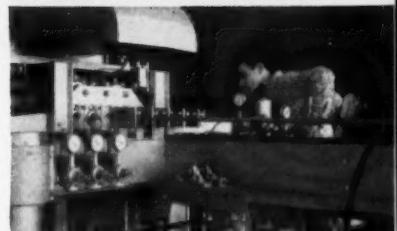
RUBBER COVERED WIRES & CABLES • VARNISHED CAMBRIC CABLES • PLASTIC INSULATED CABLES
NEOPRENE SHEATHED CABLES • "CIRTUBE" EMT

CIRTUBE EMT Ask for it!



Proper steel plus! The best cold rolled steel plus the right handling give CIRTUBE EMT its natural bendability.

Split-free, bead-free! Induction welded CIRTUBE EMT, left, proves stronger than ordinary EMT, provides easier fishing.



Easy fishing! A baked-on protective coating gives CIRTUBE EMT a built-in lubrication for easier wire pulling.

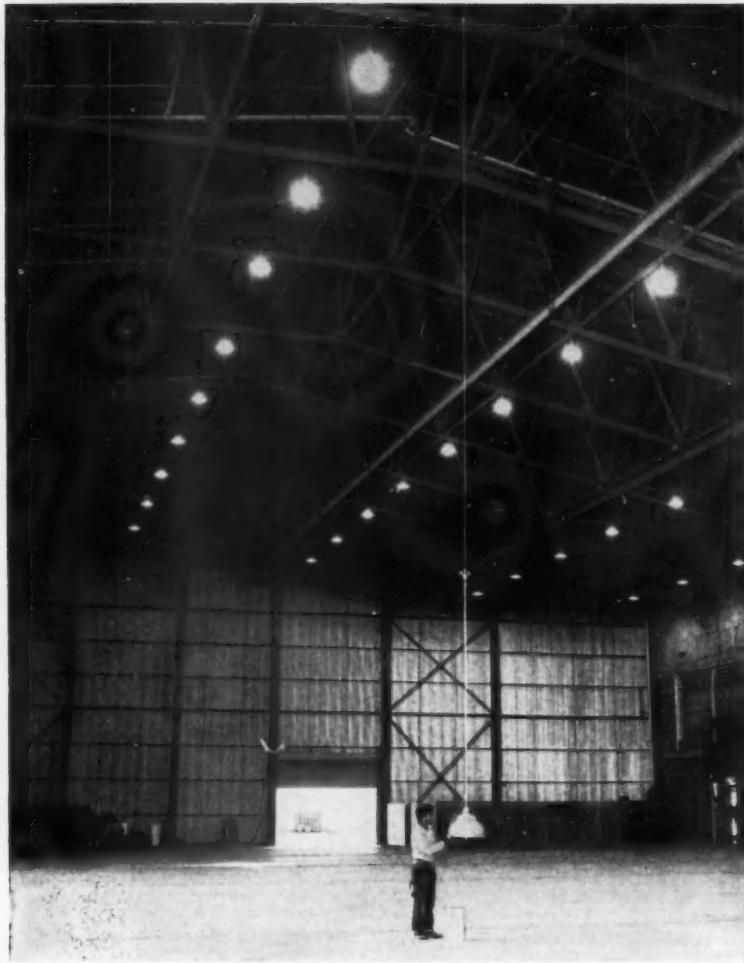
Lifetime exterior finish! Hard galvanized finish for durability; polished satin lustre for lasting good looks.



Tight, easily handled bundles! Bright, orange tapes hold CIRTUBE EMT securely for easy handling on and off the job.

Fast, friendly service! Well-known Circle service through a nation-wide network of well stocked nearby warehouses.





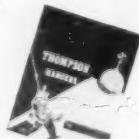
"DOWN AND OUT" IS PROFITABLE...WITH THOMPSON HANGERS

LUMINAIRE MAINTENANCE is one of very few business operations in which "down and out" means *SAVINGS* instead of failure. Faster, safer, easier servicing techniques automatically reduce maintenance costs . . . keep lighting efficiency at peak levels.

With THOMPSON HANGERS, one unskilled man can relamp and clean a luminaire within 5 minutes! Working on a "dead" fixture, with both feet on the floor, he is safe from all climbing and electrical dangers . . . needs no assistance to lower, service or re-position hi-bay lighting fixtures.

No matter how you figure it, if you want long-range economy and peak lighting efficiency, THOMPSON HANGERS are your best buy.

FOR DETAILS, WRITE TODAY
FOR BROCHURE TH-57.



THE THOMPSON ELECTRIC CO.

P. O. BOX 873-D

CLEVELAND 22, OHIO

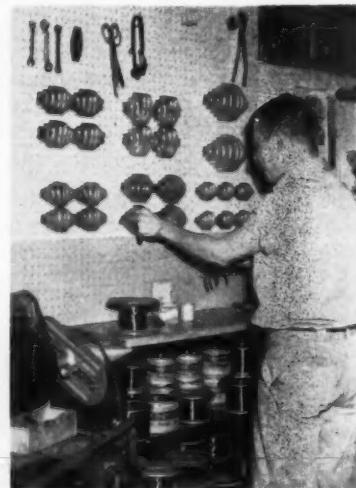


cable tension will cause the weights to drop a few inches and trigger the extinguisher. A sheet steel barrier around the weights protects them.

Through an overhead pulley system, the long flexible cable extends up and across structural roof steel to a point some 25 ft away from the dip tank. Here, it terminates in a ring with a flexible chain extension to provide an accessible hand release at about shoulder height. Cable tension is maintained by slipping the ring under and the cable in a grooved right-angle bracket mounted in the web of a steel column. A simple outward pull releases the ring and cable tension. This permits emergency manual operation should a mechanic detect a varnish fire before the automatic release mechanism operates.

Two fusible links inserted in the counterweighted cable over the dip tank provide the automatic triggering feature of the system. Should a fire escape immediate detection, the resultant heat will melt the links and release cable tension. Downward pull of the counterweights triggers the extinguisher and the resultant nozzle spray blankets the tank contents with a carbon-dioxide fog to smother the flames.

Manual release of the cable triggering mechanism proved that the system will operate as designed. While Scherer management hopes it will never have to be used, the system was developed and installed as an additional safety precaution in this somewhat hazardous shop operation.



WINDING HEADS are conveniently stored on peg board panel located adjacent to winding machine in shop of Electric Motor Service, Kennett Square, Pa.

P. Lorillard Company
Powers-Up to produce
100 million cigarettes a day
under one roof

YOU CAN BE SURE...IF IT'S Westinghouse

FRONT COVER

The completely new "electromated" Greensboro, N. C. branch of the P. Lorillard Co. is designed for tomorrow's expansion, both in power and plant layout, as well as for today's immediate production needs. Westinghouse type OV-20 outdoor lighting is used for the building approach and 650-car parking area.

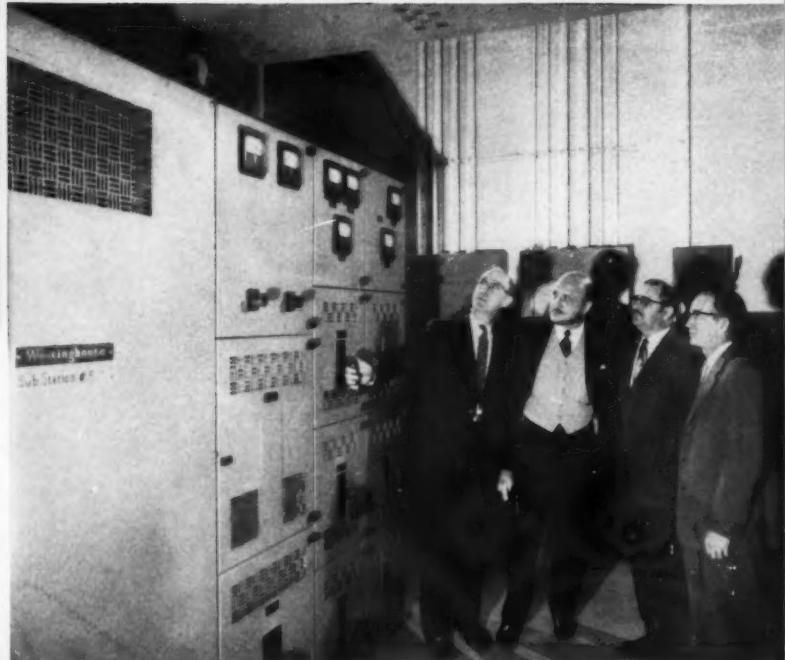
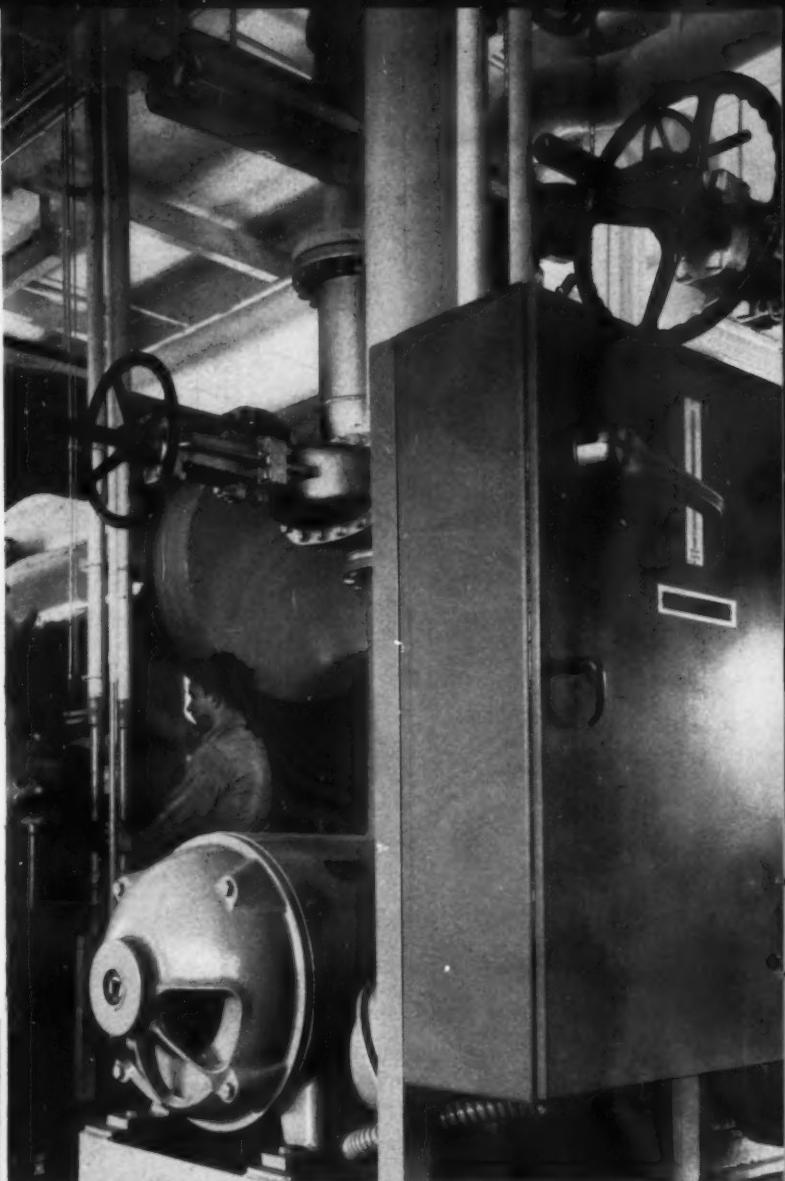
► A Westinghouse class 11-404 reduced-voltage starter provides automatic starting and protection for the Westinghouse Life-Line® 60-hp motor. The motor is part of a system which automatically controls the "man-made" climate, so necessary in the cigarette-making industry.

▼ A Lorillard maintenance man inspects the class 11-400 reduced-voltage starter which controls the 200-hp Life-Line air compressor motor supplying air to safeguard instruments. A 400-amp, 600-V, AHF-355 safety switch is shown in the background. On the wall (right) are two Westinghouse class 11-404 reduced-voltage starters providing protection for Westinghouse motors.



► O. B. Van Hise, Lorillard Plant Engineer; Wm. Folk, Jr., Westinghouse Sales Engineer; J. E. Guill of Starr Electric Co., Inc., Electrical Contractors and Engineers; H. L. Coble, H. L. Coble Construction Co., General Contractor, examine one of the plant's nine dry-type power centers. Power centers have spare circuit breakers plus blank cubicles equipped for future power needs. Overhead bus duct serves as tie-run between power centers.

J-94115-2



Westinghouse electrical equipment used for today's production and tomorrow's expansion

P. Lorillard Company, the nation's oldest tobacco firm, is now occupying the newest and most modern cigarette manufacturing plant in the country. Relying heavily on Westinghouse equipment, the ultra-modern Greensboro, North Carolina plant is electrically powered to expand capacity or to shift emphasis from filters to non-filters (or vice versa) almost overnight.

The plant is unique in the tobacco industry not only in design, but because it represents many departures from standard industry procedure. In some instances, departures were so great that new, complex machinery was designed and built.

Power is transmitted to the completely "electrified" plant at 22,000 volts and stepped down by Westinghouse transformers to 12,500 volts and distributed to nine power centers throughout the plant. These network power centers distribute 480/277 volts and are interconnected to avoid shutdown in the event of a partial power failure.

Lorillard minimized human error and bolstered

production by installing Westinghouse-driven and controlled automatic feeder-conveyors to move the processed tobacco in a steady flow above cigarette-making machines, feed it into the machines and automatically maintain the precise level of tobacco in hoppers. This system assures uniform filling and quality of every cigarette.

In addition to the substation transformers and electrical equipment for the conveyor system, Westinghouse supplied the power centers, motors and controls for the air conditioning system and outdoor lighting for the building approach and plant parking area.

Westinghouse, working with the architect-engineer, general contractor, electrical contractor and Lorillard engineers, had an active part in equipping this plant with the electrical distribution system and with other electrical components required to assure uninterrupted operation and provide for anticipated expansion. Westinghouse can help with

(cont'd)

S Over 250 pages Westinghouse data in Sweet's Construction File

J-94115-3



This Life-Line class 11-204 motor starter, with fusible disconnects, which activates the Westinghouse 3-hp Life-Line "A" motor to drive a 75-gpm pump, is located in the mechanical equipment room of the ultra-modern plant.



Westinghouse class 11-204 combination magnetic motor starters with fusible disconnects provide remote control and protection for Life-Line "A" motors located throughout the conveyor system. Equipment is designed to move tobacco from hogshead to finished cigarette without being touched by human hands.



Straight-line feeder-conveyor system continues through automatic cigarette-making, packing, cartoning and shipping. Westinghouse automatic controls, pushbuttons and switches "spot control" the conveyor process.

YOU CAN BE SURE...IF IT'S

Westinghouse

PLANT ENGINEER



Specially designed for tomorrow's expansion

any phase of your electrical planning and construction. See your Westinghouse distributor, or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-94115-4

Owner: P. Lorillard Company, New York, N. Y.
Architect-Engineers: Lockwood Greene Engineers, Inc.

General Contractor: H. L. Coble Construction Co.
Electrical Contractor: Starr Electric Co., Inc.

Westinghouse Distributor: Westinghouse Electric Supply Co., Greensboro, N. C.

Wm. Folk, Jr. (right) explains the full line of electrical equipment carried by Westinghouse distributors for immediate delivery. This reduces the inventory Lorillard must carry for replacement needs. Others shown left to right: W. D. Rhea, Power Engineer; M. W. Breitmeier, Plant Maintenance; O. B. Van Hise, Plant Engineer; J. Berner, Project Engineer; all of Lorillard Plant Engineering Section.

YOU CAN BE SURE...IF IT'S

Westinghouse

New complex machinery had to be designed and built by Lorillard to achieve this highly automated plant. J. Berner, Project Engineer, conceived, planned and built much of the special equipment. (Both Berner and R. H. Jobe, Lorillard Draftsman, sport beards in honor of Greensboro's 150th anniversary.)



Practical Methods

Diagonal Layout Of Underfloor Raceway

DESIGN

A diagonally designed underfloor electrical raceway system is installed in the new 811 Main Street Building, Kansas City, Mo. Here, this system provides today's needs and anticipates tomorrow's require-

ments for electrical, telephone and communication outlets throughout the top seven floors of the building. These floors house office facilities for the American Telephone and Telegraph Co. The unusual diagonal layout of the system assures an outlet at every desk, no matter where or how the desk is positioned.

Architects Keene-Simpson-Murphy, Kansas City, created the origi-

nal underfloor electrical design to serve the seven office floors of the new building. Electrical engineering was done by Josh Kindred and William Cassell, Kansas City. The system, employing more than 130,000 feet of six-inch H-Duct and two-inch Nepcduct is being installed by Mackay Electric Company, Kansas City.

To achieve the most desirable functional advantages of underfloor electrical distribution, the architects worked with paper cutouts of ducts scaled to model floor areas. By shuffling the cutouts into various floor patterns, the architects eventually evolved the diagonal design to provide layout of outlets suited to any possible layout of desks. The diagonal layout is both a departure and—in the 811 Main Street Building—an improvement over the ultimate potential of the more conventionally squared, grid-type installation.

Laid side by side and joined by saddle supports to form a single installation, the large and small-size ducts of the unique underfloor system criss-cross every five feet at standard junction boxes installed at the floor level. A noteworthy feature of this installation is the assortment of adjustable 2-legged metal saddles employed at regular intervals to support ducts at the proper height. To the electrical contractor the saddles represent an important installation asset. According to Joe Blumel, chief engineer for Mackay Electrical Company, the saddles keep the ducts at the same height regardless of concrete depth.

The functional benefits of the underfloor electrical distribution system are obvious. Electrical and telephone outlets are available at 24-in. intervals on each of the duct runs. Each of the outlets may be placed in service as needed. Expandability and large capacity are other important characteristics of the system. Although immediate provisions call for approximately 300 electrical outlets and 150 telephone and communication outlets to serve each of the upper stories, the future of the electrical distribution system is still literally in the floor. Large capacity and easy accessibility of junction boxes, installed at floor level, permit additions of both electrical and communications wiring without damage to the floor. Floor-flush location of the outlets provides similar convenience for change and expansion.



SADDLE SUPPORTS used with diagonal raceway system are adjustable to permit mounting of duct system in one horizontal plane over an area where the depth of the concrete slab varied from 10 in. to 24 in. Two-level saddle brackets are used in the foreground where the slab will be thick.



DIAGONAL LAYOUT of underfloor raceway system consists of parallel runs of two sizes of ducts. Large size junction boxes provide ready accessibility. Special access sections of duct, as shown in foreground, were used at various places to tie into the duct network for telephone and intercom.

Latrobe Electrical Products

There is nothing complex or intricate about "Latrobe" Floor Boxes and Wiring Specialties. Their design and mechanism is kept simple and sure.

That is why "Latrobe" products are so quick to install and so trouble free in operation.



Two Gang Adjustable Floor Box

Adjustable Boxes come in single-round or square bodies. Also in square type Single Gang, Two Gang, Three Gang and Four Gang Boxes. All adjustable boxes are now bonded which makes them fire-proof.

Non-Adjustable Floor Box

Represents the last word in unique design, neat appearance, fewest number of parts, and least amount of labor to install.



Insulator Supports

Fasten porcelain or glass insulators to steel framework without punching holes. 4 sizes—1", 1½", 2" and 2½".



"Latrobe" Pipe or Conduit Clamp

This clamp is made of malleable iron, cadmium plated to prevent rust and has a safety bite of case hardened tool steel. Two models—right angle and parallel—each in 10 sizes to handle pipe or conduit ½" thru 4".



LATROBE PRODUCTS

NON-ADJUSTABLE FLOOR BOXES
ADJUSTABLE FLOOR BOXES
GANG BOXES—COVER PLATES
JUNCTION BOXES—NOZZLES
PIPE OR CONDUIT HANGERS
INSULATION SUPPORTS
CABLE SUPPORTS—FISH WIRE
STAPLE AND CABLE CLIPS

Fullman
Manufacturing Co.

1209-1215 JEFFERSON STREET
LATROBE, PA.

Special Control For Pumping Station

CONTROL

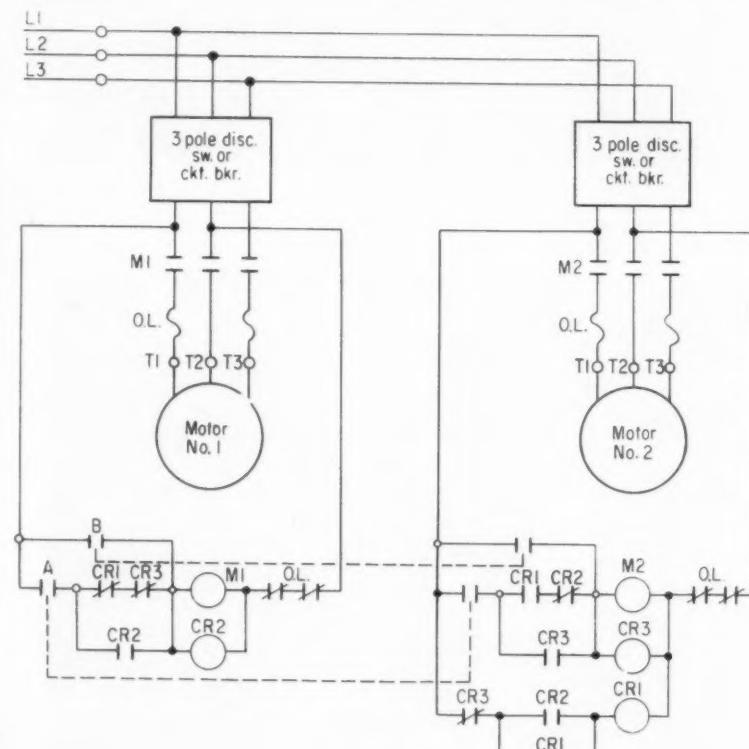
The Village of Oliver Springs, Tenn., had been hard pressed for water during the war boom period and for the years following due to the presence of the atomic plants nearby. At one time the need was so pressing as to require the use of seepage water from abandoned coal mines that had been sealed by the Works Progress Administration to eliminate the oxidation of the pyrites which form weak sulphuric acid. The elimination of air rendered the water potable.

To ease the situation, the Atomic Energy Commission granted the Village acreage at the site of the fast flowing Bacon Spring. Here, the Braden Construction Company installed a small dam to insure a full head of water over the intake pipe at all times. The site is 10 miles removed from the village proper hence a 6-in. Transite line was laid paralleling state route 61 which has a series of small residential groups bordering on it. All of these are now supplied from the new main.



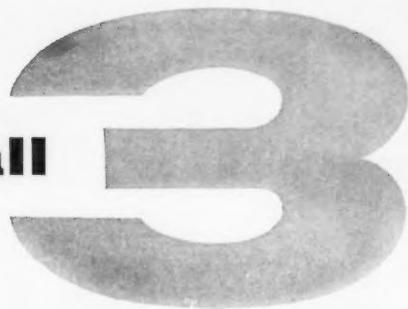
PUMP HOUSE is a sturdy brick structure with steel-plate reinforced doors to protect the enclosed equipment against damage by intruders in this remote location. Dam from which 8-in. cast iron pipe draws water to pumps is located in background behind the building. Spring runs just off to the right.

At the site of the dam, two motor starters are installed to alternate operation of pumps which power the flow of water through the new main. The arrangement provides a standby pump if one set of equipment fails and provides additional capacity if the demand increases beyond the ability of the first pump to maintain standpipe level. An additional feature is the use of an automatic equalizer unit which runs the pumps alternately, thus equalizing the wear so that



BASIC DIAGRAM of pump control circuits. Contacts marked "A" and "B" are on the two pilot devices controlling the starter coil circuits. Contacts "A" are on one pilot device and are set to close before "B" contacts close on the other pilot device. "CR" designates control relays.

Diamond has all portable cords



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for hot, oily locations

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for all locations where heat
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Red-D-Prene for mill and plant use is designed with tough, oil, heat and flame resistant Type MD (Mill Duty) neoprene jacket in industrial red for ready identification.



Black Diamond has durable rubber jacket protecting against alkalies, acids and moisture. Very flexible construction prevents kinking in service.



Signal Yellow has a jacket of yellow thermoplastic that is quickly seen... clean to handle... smooth sheath will not readily collect dirt. Easy to pull.

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START-STOP STATION
with pilot.
For surface mounting.



SELECTOR SWITCH with pilot.
Brass plate for flush mounting.



SIZE 0 COMBINATION STARTER with
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in cover.



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with pilot. For
surface mounting.



MANUAL STARTER
and selector switch.
For surface mounting.

You'll build bigger HEATING & VENTILATING PROFITS with these controls because ...

... **THEY'RE EASIER TO INSTALL AND MAINTAIN**, helping to make your work more profitable. And their added performance and dependability help build your business by insuring more satisfied customers.

... **THIS IS THE ONLY COMPLETE LINE** of motor controls and pilot devices for *all* heating and ventilating applications including: fans, blowers, unit heaters and ventilators, compressors and pumps.

... **ONLY ARROW-HART** offers you a line that includes far smaller, lighter Type "RA" Magnetic Controls that save valuable space and help you reduce installation time and costs.

Act now to make your next job more profitable. Send today for your free 16-page booklet completely describing how to wire Arrow-Hart Motor Controls.

Write to *The Arrow-Hart & Hegeman Electric Company, Dept. ECM, 103 Hawthorn Street, Hartford 6, Connecticut.*

ARROW AH HART
Quality since 1890

MOTOR CONTROLS • ENCLOSED SWITCHES
APPLIANCE SWITCHES • WIRING DEVICES

both can be written off together.

The alternator controls the energizing of the separately mounted starters to operate first one pump motor and then the other at each successive closing of a single pilot switch or pressure control. This pilot device is ordinarily a double-pole float switch or pressure device in most installations. A second or emergency pilot device may be set to close only if the liquid level keeps dropping after one pump has been started. With two pilot devices closed, both motor starters are automatically energized and both pumps will operate.

With one pump motor running, if the control circuit of the starter is deenergized, because of an open circuit due to fuse rupture, coil failure, or tripping of an overload relay, the other pump motor will automatically be started and will continue to operate whenever needed until power is restored to the control circuit of the first starter.

Three phase power at 480 volts, 60 cycle is furnished by the Clinton Power Commission through three 10-kva transformers mounted on the final pole. The metering equipment is installed indoors and the architect, knowing of the isolated nature of the site, designed the structure to be safe against intrusion, without windows and with steel-plate reinforced doors.

Safety Helmet Saves Man

SAFETY

Earl Vaughn, lineman with San Antonio's Public Service Board knows from experience that personal involvement in an "accident incident" effectively stresses the wisdom of wearing proper safety apparel when exposed to normal oc-



SAFETY HELMET which saved him from injury by electrical arc is shown by lineman Earl Vaughn (right) to his co-worker William Ortman who was working on the line at the time of the accident.

cupational hazards. Compliance with a company recommendation for wearing a safety hat is credited with saving Mr. Vaughn serious injury when struck by a high-voltage electric charge during line operations.

The accident occurred as the result of an erroneous connection made when lineman Vaughn and another crewman, William Ortman, were working at either end of a jumper. While Vaughn was connecting the jumper to the line side of the A-phase cutout and tightening it with his fingers, lineman Ortman mistakenly attempted to put the hot clamp on B-phase, located above his head. The A and B-phase contact sent a live charge racing through the jumper. When the arc was broken seconds later, lineman Vaughn's safety hat was found to be badly damaged, although he suffered only a slight burn along the nape of his neck. His partner in the operation was fortunate to escape with a burned sleeve.

For lineman Vaughn, the lightweight, plastic helmet, manufactured by Mine Safety Appliances Company, Pittsburgh, bore the brunt of the electric charge and reduced a potentially serious accident to a minor incident. The helmet is designed specifically to protect linemen and electrical construction workers against high voltage contact, as well as against falling objects. Co-workers of lineman Vaughn acknowledge the reflection on the "serious consequences of what could have resulted" is at least second best in making a case for the correct use of safety clothing and equipment on job assignments.



CLASSROOM WORK at estimating school, conducted by Ralph H. Decker for the Cook County Electrical Contractors Association in Chicago, gets full attention of (L to R) Joe Cardinal, Jr., Avenue Electric Co., Chicago; Bill Trumbull, Trumbull Electric Co., Maywood, Ill.; Jim Sharpe, Associated Electric Co., Chicago; and Ken Parker, Parker Electric Co., Chicago.

With these TWO

New *Quiette*® switches



The *INTERCHANGEABLE*

15 or 20 Amps, 120-277 Volts, AC Only. 15 Amps, 120-277 Volts, AC Only.

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Junior

...ARROW-HART Now Offers You
the ONLY Complete Line of Quiet
Tap Action Switches Anywhere!

All three switches in this complete line - the compact and inexpensive new *Junior*, the versatile new *Interchangeable* produced *ONLY* by Arrow-Hart - and the built-for-a-lifetime *Senior* - tap on or off with the gentlest pressure of fingertip, hand or elbow anywhere on the button. All feature quiet mechanical action, operate on full voltage without relays, and provide safe control for incandescent or fluorescent lights ... and for household appliances. Designed to effect important space savings that assure ease of wiring ... and to provide electrical convenience at its finest ... they are truly tomorrow's switches available today!

FOR FULL INFORMATION ... on the complete A.H. line of *Quiette Tap Action Switches*, write today for your free copy of Booklet No. A-242.

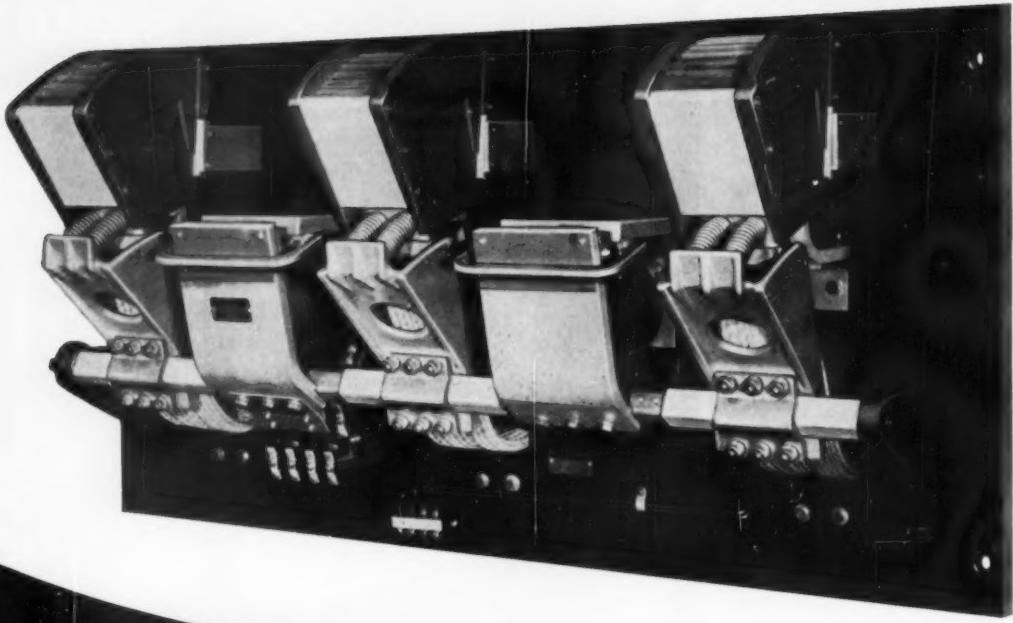
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Increases contactor life in motor starters

ONE look reveals the clean, balanced design of Allis-Chalmers contactors. Fewer parts eliminate many potentially troublesome areas — mean less wear. Simple, solid construction and high interrupting capacity are positive assurance of reliability.

When you specify starters be sure to get the long-life features provided by Allis-Chalmers contactors. It is these contactors that make the complete range of Allis-Chalmers low voltage starters, from Size 4 through 8, the dependable performers they are.

Get all the facts. Call your nearby A-C sales office or distributor, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wis.

*7th meaning, Webster's New Collegiate Dictionary, Second Edition.



A-5779

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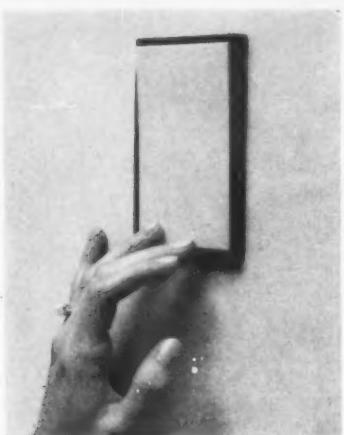
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Product News



Wall Switch (1)

A new wall switch, called "Fashion Plate" is revolutionary in styling. It is a straight-sided, rectangular wall plate that frames a large actuator. Touch the top of the actuator lightly for "on"; bottom for "off". The single-pole and 3-way switches are provided with a "feed-through" terminal that, being electrically insulated from other live parts, provides a junction for splicing the through wire in the switch box. To make a splice, the two stripped ends of the through wire are inserted under the curved nut and the washer head screw tightened. Switch is available in 15- and 20-amp ratings for use on ac where the voltage ranges from a nominal 120 to 277 volts. It can be used at its rated capacity to control incandescent lamps, resistance heaters, and inductive devices, and at 80% of its rated capacity for motors.

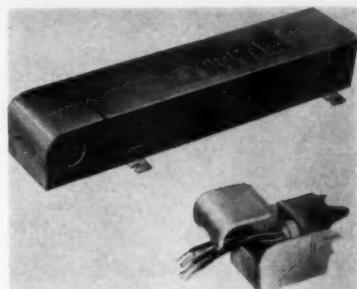
Switch is made to mount in standard wall boxes. Wall plates and actuators are available for mounting singly, or in 2- or 3-gang combinations. After the switch is installed in the wall box, the wall plate, with an opening to match the actuating lever, is snapped into place. It is held tightly in place by spring members integral with the switch mounting yoke. If desired, the wall plate may be secured by screws to the yoke. The actuator, having integral pins, fits into a recess in the wall plate. The pins are forced into matching holes in the actuating lever where they are held in place by the pressure of wire spring clips. Wall plate to be black or white and actuator opaque ivory or clear plastic.

Bryant Electric Company, Bridgeport, Conn.

Lighted House Numbers (2)

A new type of illuminated house number called "Welcome Light" operates on low-voltage doorbell current. Units available in variety of designs including recessed model for brick walls and double-faced unit primarily for commercial use. Unit requires no switch and is "on" continuously. Units are custom-assembled at factory with numerals plastic-welded to face plate.

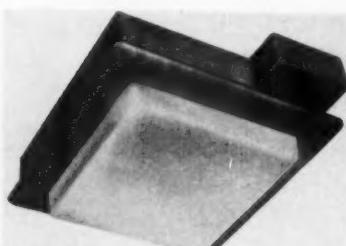
Calumet Plastics, Inc., 10213 S. LaSalle St., Chicago 28, Ill.



Ballast (5)

Fluorescent ballast, called Nor'easter, is completely weatherproof. Entire case is hot-dip galvanized for corrosion resistance and, after ballast assembly, seams of lid are brazed to form a completely sealed unit. Aqualift Sealant prevents moisture from entering through pipe nipple where leads exit. Extra heavy mounting brackets are provided. Ballast can be mounted in any position, and wiring compartment is open on two sides so conduit lock nuts may be secured. Four knockouts are provided, so conduit can be brought through either side, bottom or end of ballast. The new models are considered ideal for highway lighting, area lighting, billboards and plastic signs, and are available for 800, 1400 and 1500 ma lamps. Literature is available.

Jefferson Electric Co., 25th and Madison Sts., Bellwood, Ill.



Lighting Fixtures (3)

New weathertight recessed downlight, 4-1215, with a shallow 3-in. depth is for use in wet locations such as canopies, sidewalks, corridors, entrances, vestibules and shower rooms. Unit features anodized cast aluminum trim, two neoprene gaskets eliminate light-leak and ceiling dust-streak, 16-gauge hot-dipped galvanized steel housing may be used as a pouring form in concrete ceilings, external splice compartment for wiring in continuous installations. The 4-1215 will accommodate two 100-watt lamps, the 4-815 one 150-watt lamp. Both units extend 1½ ins. from ceiling.

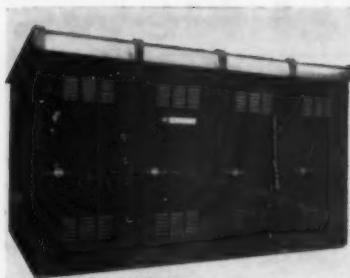
McPhilben Lighting Inc., 1329 Willoughby Ave., Brooklyn 37, N. Y.



Clamp (6)

Designed for primary and secondary deadending, the CUW-R type clamp combines the snub action of a deep cable groove pocket with the wedge action of a V-groove for maximum holding strength on each cable size throughout the entire range. Four clamps cover range from No. 4 ACSR through 636 ACSR and No. 2 through 715.5 all aluminum. Additional features include a saddle with captured U-bolts, lifting eye and side pulling eye standard on all sizes. Long U-bolts enable cable to be threaded into clamp without removing clamp.

Burndy Corporation, Norwalk, Conn.



Outdoor Heating (7)

New outdoor housings featuring improved weatherproofing and styling have been developed for use with the company's line of 5 and 15 kv metal-clad switchgear. Designed primarily for electric utility and industrial metal-clad switchgear applications, the housings can also be supplied for low voltage metal-enclosed switchgear, high voltage contactor type motor starter assemblies, and metal-clad disconnect and interrupter switch units. Housings are available in either standard outdoor type or "walk-in shelter" type design. Ventilation is provided by louvers in front and rear doors, backed by washable filters that prevent entry of water, dust and other foreign materials.

Federal Pacific Electric Co., 50 Paris St., Newark 1, N. J.



Instrument (8)

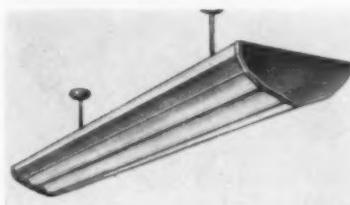
New portable Model UV-1 voltmeter is for measuring voltages up to 600 volts, ac or dc, and is designed to fit into the palm of the hand. Unit is 2 by 2½ by 4½ ins. and can be carried in average pocket. Readings are taken by first inserting safety plug into a receptacle on instrument and then connecting the voltage leads to the line. One lead is equipped with an insulated clip, the other with an insulated prod. By use of a rotary switch, user can select one of four voltage ranges: 0-150 ac or dc, 0-600 ac or dc.

Columbia Electric Mfg. Co., 4535 Hamilton Ave., Cleveland 14, Ohio

Communication System (9)

A new phone-page system that permits a 2-way conversation between phone and loudspeaker. The person being paged can reply directly through the loudspeaker. For paging lift the phone off the cradle and press the pushbutton. This button will connect speaker onto the output of the amplifier and simultaneously light the "In Use" lights on all the phone bases. There can be as many as 20 phone stations. After announcement is made and page button released, speakers are reconnected automatically as microphones and anyone on receiving end of page can reply immediately to original caller.

David Bogen Company, P. O. Box 500, Paramus, N. J.



Lighting Fixture (10)

New narrow 4-light "Leadlighter" fixture is 12½ ins. wide. Features are efficiency of 80%; wide light spread; high maintenance factor due to self-cleaning action of up-drafts, induced by slat arrangement; all steel construction. Series is available in 2-, 3-, 4- and 6-lamp.

Leadlight Fixture Co., 800-100th Ave., Oakland, Calif.

Base for Lighting (11)

Metal pipe base for outdoor lighting has been redesigned for greater rigidity between base and pipe upright, easier installation and prevention of corrosion at the threaded joint. Malleable iron base with ample junction chamber contains a hub threaded to receive a length of ordinary pipe or conduit upright, to form a standard for outdoor lighting or for mounting signs, signals, police call or fire boxes. The redesigned hub provides full pipe thread engagement within the base, to seal out moisture and prevent corrosion. Available in four sizes with either a plain junction chamber cover or one containing a weatherproof 3-pole receptacle to permit plugging in hand tools, electric mowers or auxiliary lights.

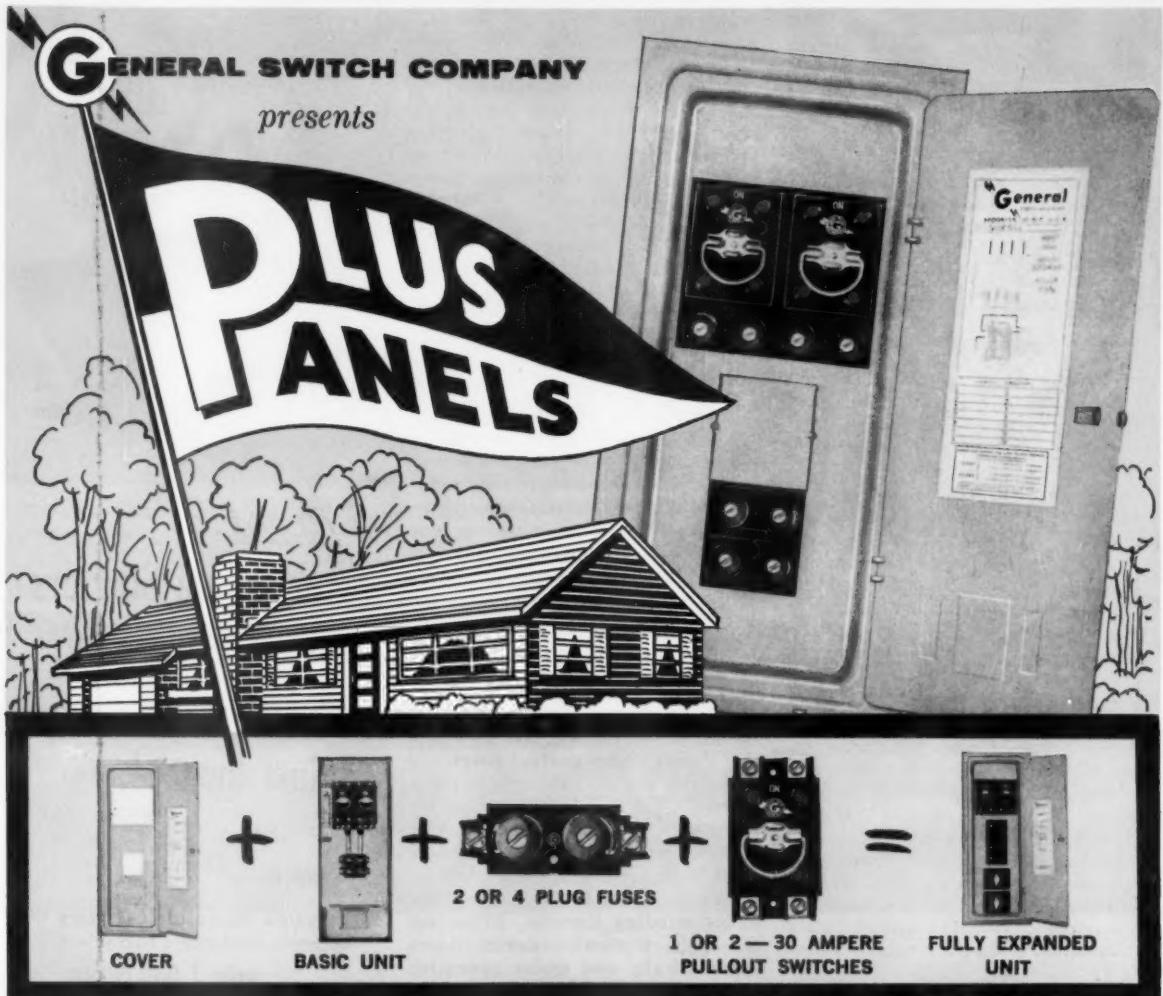
Hope Electrical Products Co., 39 Long Ave., Hillside, N. J.



by **GENERAL**
SWITCH
COMPANY

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a new
manufacturing
idea, offering the
electrical contractor
all the advantages
of fusible
and expandable
service entrance
equipment!

THE SWITCH IS TO GENERAL



NEW PLUS PANEL CONSTRUCTION PROVIDES EXPANDABLE SERVICE ENTRANCE EQUIPMENT

FOUR BASIC CATALOG NUMBERS, each 100 Amp. main rated, provide adequate service for immediate use and reserve facilities for housepower to be added later.

CAT. NO. 2514: "Main-Range and Four" with reserve housepower to add four lighting circuits.

CAT. NO. 2518: "Main-Range and Eight" with reserve housepower to add two or four lighting circuits.

CAT. NO. 518: "Main and Eight" with reserve housepower to add up to four lighting circuits and also two appliance pullouts.

CAT. NO. 5518: "Main-Range and Eight" with reserve housepower to add up to four lighting circuits and also two appliance pullouts.

THE SWITCH IS TO GENERAL

► WRITE FOR PRODUCT DATA BULLETIN NO. 135.



GENERAL SWITCH COMPANY
DIVISION OF NORBUTE CORPORATION
45 ROEBLING STREET • BROOKLYN 11, N. Y.

MANUFACTURERS OF ENCLOSED SAFETY SWITCHES • SERVICE ENTRANCE EQUIPMENT • BRANCH CIRCUIT PANELS

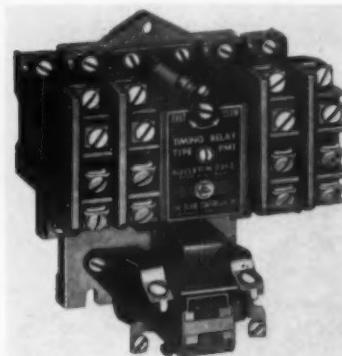


Service Equipment

(12)

A remodelled line of fusible service equipment for residential use. Previously the company offered 100 varieties of devices that were assembled as complete units and installed in the enclosures at the factory. The new line reduces the number of enclosures to three and interior combinations to six, plus a few plug-in connectors to permit flexible circuit variation. Each item is sold separately for contractor assembly. Contractors need only to invest in and install an enclosure during the early stages of construction, adding the interior when the home is nearly complete and when the owner has finalized on electrical requirements. Equipment is designed to service homes ranging from small 2-bedroom buildings to large ones with full housepower.

Square D Company, 6060 Rivard St., Detroit 11, Mich.



Relay

(13)

A pneumatic time delay relay, known as "PMT", has been added to this line of 10-amp relays. Bulletin 7313 Type "PMT" features space-saving modular construction, and universal poles with isolated contacts so that two circuits per pole may be used, even at opposite polarity. Type "PMT" is available in 32 variations of five basic models. All models are available for "on-delay" or "off-delay". Conversion

between "on-delay" and "off-delay" may be made in the field, and poles are interchangeable between timed and instantaneous operation in the field. Design features include all-front access for wiring, inspection and maintenance and poles mounted in independent melamine pole blocks which are individually removable and replaceable without disturbing other poles or their wiring.

Clark Controller Co., 1146 East 152d St., Cleveland 10, Ohio

Motors

(14)

A new line of inherently protected, 3-phase, small integral-hp motors, designed to respond to both current and temperature for protection against excessive overload currents, stalls, single-phasing and high ambient temperatures. Motors are for use with air conditioning and refrigeration compressors, centrifuges, barn cleaners, silo unloaders, laundry extractors and other applications where severe-duty cycles are encountered. Listed by UL. Each protector contact and its heating element is in series with the Y-connection neutral point and a phase of the motor winding. When thermal disc snaps open—either from high ambient temperature or from excessive motor current—connection is broken at neutral point interrupting the current in all three motor winding circuits. After motor cools, protective device resets automatically and motor operation is resumed. Motor can be disassembled—end shield, baffles, rotor assembly, and bearings removed, without disturbing the protector or making connections.

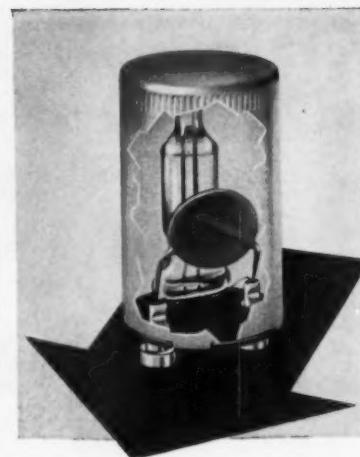
General Electric Co., Schenectady 5, N. Y.

Ceiling

(15)

A Lumenated ceiling consisting of large one-piece egg-crate plastic louvers. Basic design of ceiling is a 48-in. by 24-in. unit with main supporting tracks running in the 24-in. direction. Track system is of rigid construction. Four parts are required to assemble—track section, hanger unit, track coupling and louver. It is recommended for use in air conditioned areas as the combination of pressure, gravity and pull of return grills will move the air in a draft-free pattern through the 76% free louvered ceiling.

John J. Fannon & Company, 3000 E. Woodbridge, Detroit 7, Mich.



Proof...

Sylvania Starters with ceramic condensers last longer!

*According to actual
field test—*

Sylvania fluorescent starters with ceramic condensers had

only 1 failure out
of 340 starters

Conventional starters with paper condensers had

51 failures out of
330 starters

Test was conducted over a two-year period in a manufacturing plant. Installations were Two-lamp, 40-watt industrial type fixtures.

Results like these prove that Sylvania starters with ceramic condensers give longer life and lower maintenance cost at no increase in price.

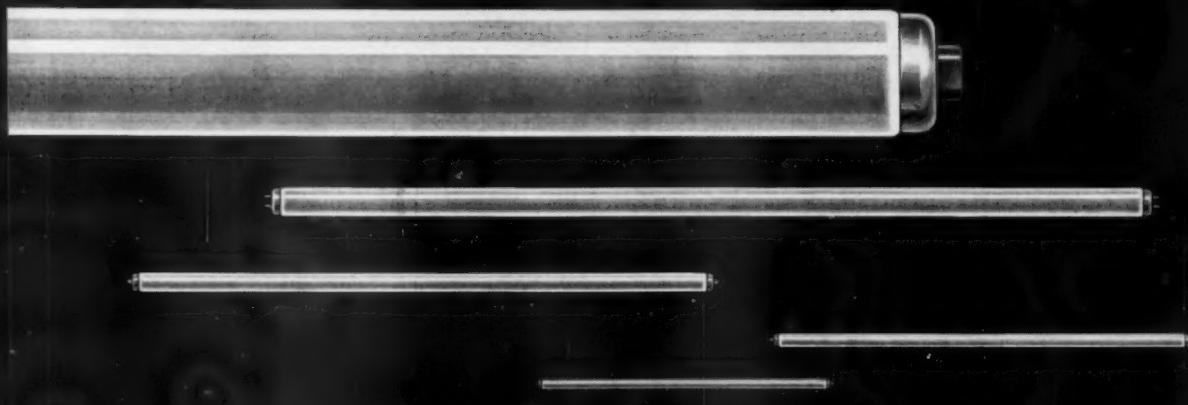
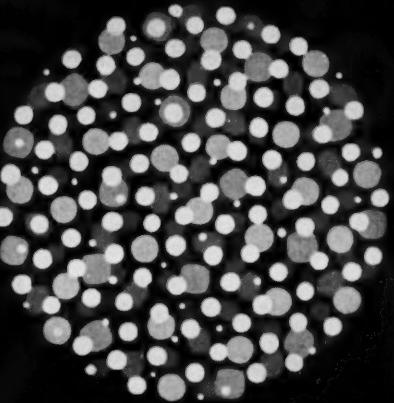
For details, call your Sylvania Representative.

SYLVANIA LIGHTING PRODUCTS
A Division of
SYLVANIA ELECTRIC PRODUCTS INC.
Dept. 8L-8310, 60 Boston Street, Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.,
P. O. Box, 1190, Station "O", Montreal 9

SYLVANIA

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Lighting • Television • Radio • Electronics
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Only Sylvania's exclusive
coating process
homogenizes phosphors
for maximum brightness



An exclusive process homogenizes Sylvania's brighter phosphors—
produces today's most uniform lamp coating for today's brightest lamps

Another reason why

**Sylvania Fluorescents give more light
at lower cost than all other brands**

**Advanced engineering makes
Sylvania fluorescent lamps
superior in many ways—
makes light a better tool of
production to increase profits**

The story of phosphors is the history of chemistry in lighting. And from the beginning Sylvania has pioneered today's brighter, longer lasting fluorescent phosphors.

Year after year, Sylvania lamps have delivered more light for a far longer time than ordinary fluorescents

because of their superior phosphors. In fact, only now are some other brands being introduced with the phosphor quality which Sylvania has long since improved.

One of these improvements is an exclusive coating process which uniformly distributes the phosphors throughout the tube. This unsurpassed uniformity is made possible by homogenizing the phosphors—and contributes a minimum of 3% greater brightness over other processes now in use.

This is another example of how Sylvania builds extra value into fluorescent lamps to help cut lighting and operating costs.

Let your local Sylvania Representative show you how Sylvania's superiority can increase your lamp volume and profits, or write:

SYLVANIA LIGHTING PRODUCTS
Division of SYLVANIA ELECTRIC PRODUCTS INC.
60 Boston St., Dept. 8L-8310, Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
P. O. Box 1190, Station "O", Montreal 9.

SYLVANIA Lighting Products
make light a better tool for profits

How big is your comfort heating problem?



Call your CHROMALOX Man for the Answers

Every modern heating feature you want can be found in today's complete Chromalox line of quality electric heating equipment. You can depend on your Chromalox Sales-Engineering Representative for the answers to any kind of space heating problem . . . whether it's a watchman's shelter, an office or an entire building.

For those hard-to-heat spots, Chromalox blower units provide positive warm air circulation to every corner. For outdoor work areas, such as loading docks, Chromalox Radiant Heaters keep your workers on the job even in sub-zero weather. No matter what or how big your comfort heating problem may be, your Chromalox Man can help you find the best answers. Chromalox gives you:

- a choice of rugged yet attractively styled blower, convection or radiant type heaters.
- portable, mounted or built-in units.
- $\frac{1}{4}$ to 40-kw. capacities.
- automatic or manual controls.

Chromalox Electric Heat is economical to put to work, too, and there's no maintenance! For full information, call the Man with the Answers . . . your Chromalox Sales-Engineering Representative listed at the right.

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CHROMALOX
Electric Heat
INDUSTRIAL • COMMERCIAL • RESIDENTIAL
EDWIN L. WIEGAND COMPANY
7637 Thomas Boulevard • Pittsburgh 8, Pa.

Call Chromalox
for the man with the
ELECTRICAL ANSWERS
to your heating problems

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Trinity 5-7244

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Mohawk 4-6113
Greenwood 3-4477

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R. P. Smith Co., Inc.
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Phone 4-7703

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R. L. Faber & Assoc., Inc.
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New York: Worth 4-2990

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Leo C. Pelkus & Co., Inc.
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Liberty 2-1941

BUFFALO 2, N.Y.
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H. R. Miles & Associates
P.O. Box 172
Amherst 5-3862

CHICAGO 5, ILL.
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407 S. Dearborn St.
Harrison 7-5464

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Phone 3-706

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Prospect 1-1112

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L. R. Ward Company
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DAVENPORT, IOWA
Volco Company
215 Kahl Building
Phone: 3-2144

DENVER 2, COLO.
E. & M. Equipment Co.
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Glendale 5-3651
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Midwest Equipment Co.
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Cherry 3-9103

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Carman Adams, Inc.
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Capitol 5-0356

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Couchman-Conant, Inc.
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Melrose 5-5313

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Fraser D. Moore Co.
106 E. 14th St.
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Richmond 7-9401

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Diamond 6-9606

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Gordon Hatch Co., Inc.
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Broadway 1-3021

MINNEAPOLIS 4, MINN.
Volco Company
831 S. Sixth St.
Federal 6-3373

NASHVILLE 4, TENN.
H. R. Miles and Associates
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Cypress 2-7016

NEW YORK CITY, N.Y.
See "Bloomfield, N.J."

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Midwest Equipment Co.
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Atlantic 7600

PHILADELPHIA, PA.
See "Bala-Cynwyd, Pa."

PITTSBURGH 6, PA.
Woessner-McKnight Co.
1310 Highland Building
115 S. Highland Ave.
Emerson 1-2900

PORTLAND 9, ORE.
Montgomery Brothers
1632 N.W. Johnson St.
Capitol 3-4197

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O. M. Thompson
Westhampton Station
P.O. Box 8762
Atlantic 8-7858

ROCHESTER 4, N.Y.
Niagara Electric Sales Co.
131 Clinton Ave. S.
Hamilton 6-2070

ST. LOUIS 1, MO.
C. B. Fall Company
317 N. 11th St.
Suite 1001
Chestnut 1-2433

SAN FRANCISCO 3, CALIF.
Montgomery Brothers
1122 Howard St.
Underhill 1-3527

SEATTLE 4, WASH.
Montgomery Brothers
911 Western Ave.
Howard 3-2748

SYRACUSE 6, N.Y.
R. P. Smith Co., Inc.
2507 James St.
Howard 3-2748

WICHITA 2, KAN.
Fraser D. Moore Co.
Room 211 Derby Building
352 N. Broadway
Amherst 2-5647



Bending Machine (16)

Hydraulic bending machine that bends pipe or thin wall tubing up to 3 ins. in thickness at angles up to 180° in a single operation. Any type of bend can be made on the Model 3 bender, including offset and reverse, and repeat bends. Bender uses a 3 hp, 3-phase 220/440-volt motor. All exposed electrical components are weather-proofed, and a magnetic starter with overload protection is furnished.

Engineering Associates, 6547 West Blvd., Inglewood, Ore.



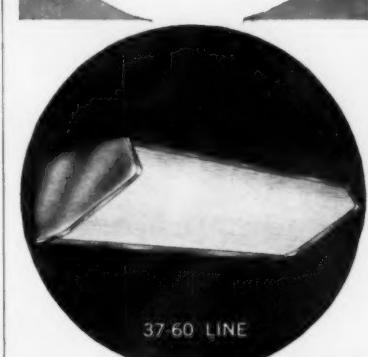
Circuit Breakers (17)

Two new molded-case circuit breakers, providing 225- and 400-amp continuous-current ratings, designated JK and JKL. Available in both 2- and 3-pole models, the units provide interrupting ratings of 25,000 amps at 600 volts ac. Approved by UL. Features are new interchangeable thermal-magnetic trip units which can be set at five different instantaneous trip values and may be adjusted from front panel after breaker installation; and unique front-removal lug design that assures interchange of trip units after the breaker has been installed. Breakers are quick-make-and-break and trip-free. All poles open simultaneously through common trip action when overload occurs on any one pole. A 3-position handle indicates if breaker is on, off or tripped.

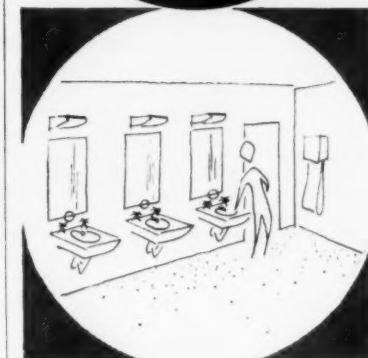
*I-T-E Circuit Breaker Company,
19th and Hamilton Sts., Philadelphia 30, Pa.*

new

**lighting
design
by
mc Philben**



37-60 LINE



mcPhilben's new 37-60 line designed by E. Allan Rothman provides the most efficient lighting of fitting rooms, mirrors, stair landings, telephone bookstands... wherever localized illumination is desirable.

Available in both fluorescent and incandescent models offering these exclusive features: continuously hinged doors for easy relamping... all metal construction... baked on grey enamel finish... removable reflectors for easy access to electrical components.

37-60 Two 60 watt lamps
37-65 Two 15 watt T-8 fluorescent lamps

Contact your mcPhilben representative for full details. See our insert in Sweet's file 32a or write for data sheet C/27

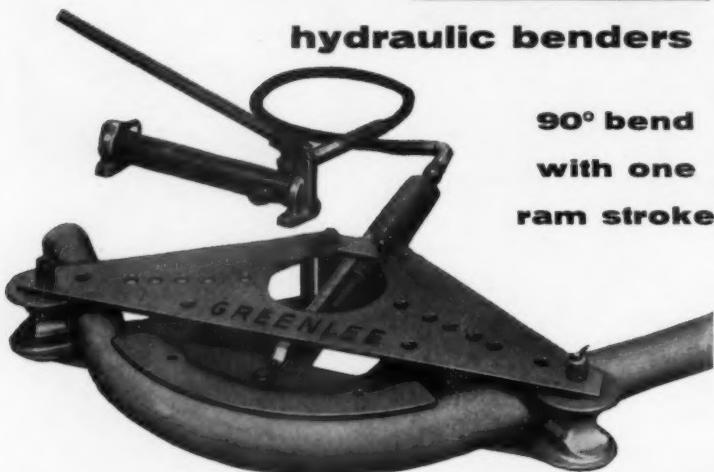
mc Philben
LIGHTING COMPANY

1329 WILLOUGHBY AVENUE, BROOKLYN 37, NEW YORK

Choose from the GREENLEE COMPLETE LINE

of fast LIGHTWEIGHT
hydraulic benders

90° bend
with one
ram stroke



NEW No. 883 for 1/2"-3" pipe and rigid conduit.

Completes the GREENLEE unique line of fast, convenient, lightweight hydraulic benders. Makes quick, smooth, accurate bends of any size up to 90° with one ram stroke. Operates with GREENLEE No. 798 Power Pump or No. 768-M4 Hand Pump. Easily wheeled from job to job on pipe supports specially designed to serve as rollers. Has all these advantages in common with the other GREENLEE lightweight benders:

- High-strength aluminum and steel construction for minimum weight, maximum strength.
- Any bend up to 90° made quickly with the GREENLEE Hand Pumps . . . in seconds with the GREENLEE Power Pumps.
- Easily portable by one man.
- Fast one-man setup — rotating universal pipe supports with quick-change removable pipe support pins.
- Conduit or pipe inserted and removed from front of bender.
- Ram fits GREENLEE thin-wall conduit and bus-bar bending attachments.
- Built-in gauges facilitate identical bends.
- Benders operate in any position.
- GREENLEE line of lightweight benders handles complete range of sizes, $\frac{1}{2}$ " - 4".

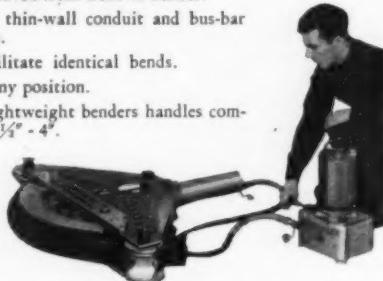


No. 884

For sizes $\frac{1}{2}$ " - 4". Operates with GREENLEE No. 798 or No. 797 Power Pump or No. 726 Hand Pump.

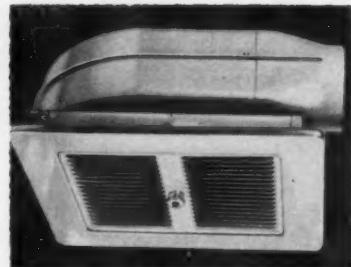
No. 880

For sizes $\frac{1}{2}$ " - 2". Operates with No. 768-M4 Hand Pump or No. 798 Power Pump. Easily carried by one man.



GREENLEE TOOL CO.

1741 Columbia Avenue, Rockford, Illinois



Ventilating Fan (18)

A new bathroom ventilating fan that fits into the ceiling or 2 by 4 side wall, discharging through 3-in. round duct. Other features include an extra-wide flange on the anodized aluminum grille to cover variations in cut-out and a newly designed blade and motor for quiet operation. A built-in back draft damper prevents heat loss.

Nu-Tone, Incorporated, Madison and Red Bank Roads, Cincinnati 27, Ohio



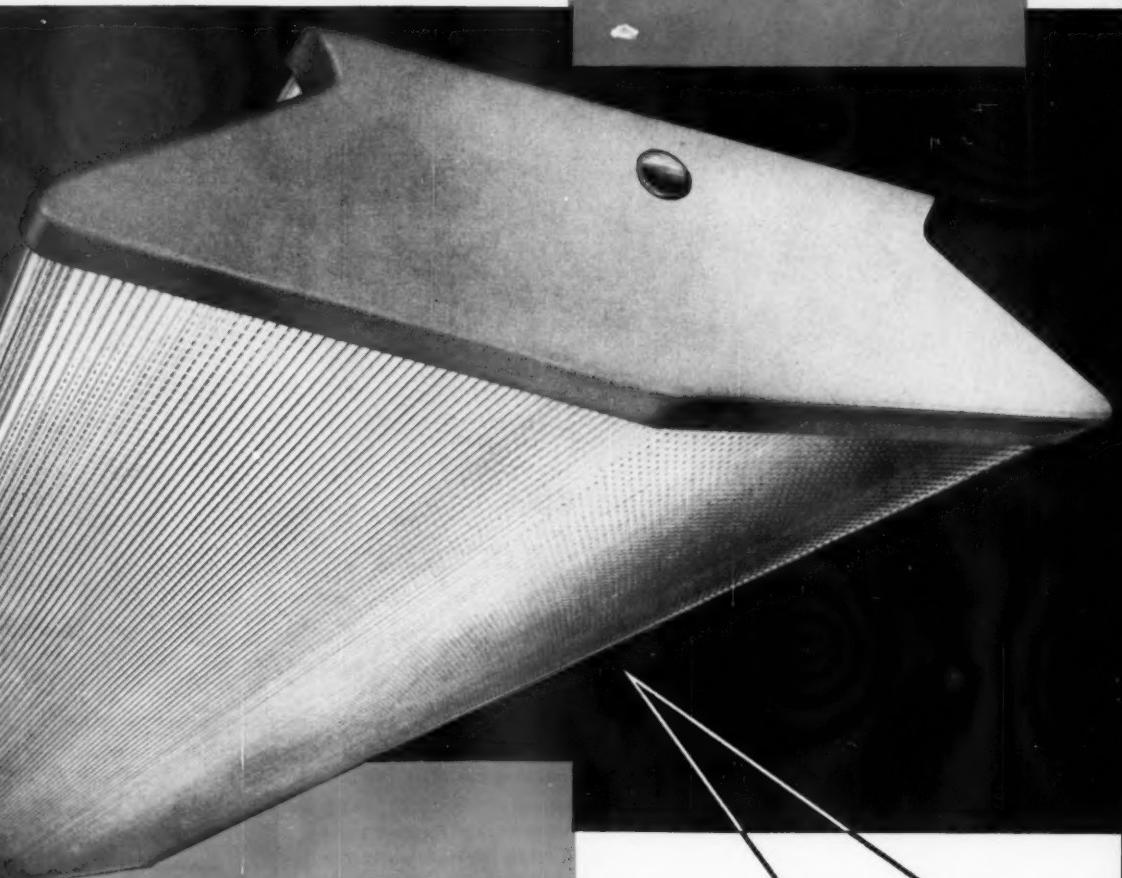
Motors (19)

Tube type totally enclosed fan-cooled squirrel-cage motors are offered in polyphase ratings through 500 hp. Cooling is provided in steel frame motors by a series of tubes through which outside air is forced by an external blower. An internal blower at each end of rotor circulates the warm air inside the motor through ducts in rotor and stator and around the cooling tubes, to hold the temperature rise within the specified limit. Standard enclosed motors are built with Class A insulation for 55°C rise or with Class B insulation for 75°C rise. Explosion-proof motors are built with Class A insulation only and have UL approval for operation under classified hazardous conditions. Motors can be supplied bearing labels for Class I, Group C and D or Class II, Group E, F, and G locations.

Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14, Mo.

Something Really Different in Fluorescent Lighting . . .

SABRE
by miller



Here is a fresh approach to the design concept of on-the-ceiling fluorescent lighting. Sabre by Miller has styling, comfort, and high efficiency that meet the needs of modern stores, offices, and schools — interiors of all kinds.

Sabre's shallow depth and swooping "Flite-Line" styling blend to enhance the appearance and decor of any interior. Efficiency of 74.5% means fewer fixtures per footcandle are needed to make today's high lighting levels practical.

Sabre's carefully engineered, one-piece wrap-around refractor of prismatic, crystal-clear plastic provides added sparkle, and excellent brightness control. Viewing is comfortable from all angles. Maintenance is easy.

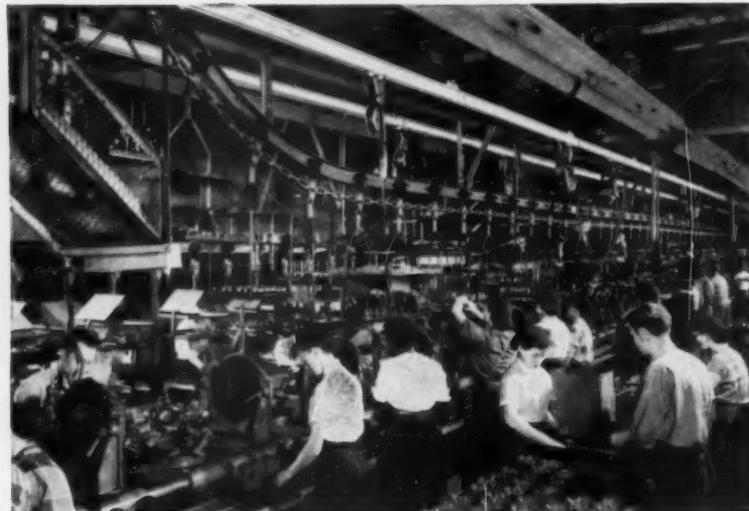
And, this unique combination of features comes at a truly popular price. Discover today, how the new Sabre can meet your specific lighting design and installation needs. Write Dept. 958-E, The Miller Company, Meriden, Conn. for complete performance and specification information, or contact your Miller Representative for a physical demonstration.

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SINCE 1844

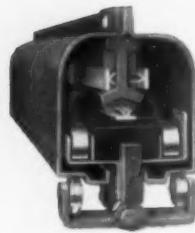
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keeps production on the move



**...because it moves
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Feedrail systems (60 to 500 amperes) keep production moving throughout industry — provide convenient movable power sources for:

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Eliminate the dangerous, time-wasting "cable clutter" of old-fashioned production lines — and you've gone a long way to speeding up production.

Feedrail "moving power systems" do this by feeding power to portable tools and other electrical equipment through *overhead mobile outlets*.

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Result: faster, safer production.

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Find out what a difference Feedrail can make in your plant production. Get all the details. Write today to Dept. C-10.

SOLD BY MORE THAN 1,000 ELECTRICAL DISTRIBUTORS FROM COAST TO COAST

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125 BARCLAY STREET • NEW YORK 7, N.Y.

SPECIALLY QUALIFIED REPRESENTATIVES IN PRINCIPAL CITIES



Oil Well Panel

(20)

A new all-weather oil well panel automatically controls single phase pumping units up to 5 hp at 220 volts, or 2 hp at 110 volts, 60 cycle operation. Main elements in oil well panel are its time lock, motor starter and short circuit protection device. Magnetic motor starter is combined with a selector switch. Electrical protection is offered by either a 2-pole Stablok circuit breaker used as a main switch (to 70 amps), or by a 2-pole pull switch where fuses are desired (to 60 amps). It measures 11 by 19 by 5 ins. and weighs 33 lbs. Three models are available.

Federal Pacific Electric Co., 50 Paris St., Newark 1, N.J.



Lighting Fixture

(21)

A new shallow fluorescent lighting fixture, 520 PL series, particularly adaptable to installations where close work is done. Available with closed top for downlight, or open top for uplight. Socket is rotary lock type for bipin T12 lamps. Multisecopic spring actuated for single pin T12 slimline lamps. Translucent polystyrene sides. One piece 48 in. destaticized polystyrene louver $\frac{1}{2}$ by $\frac{1}{2}$ by $\frac{1}{2}$ cell—45° compound shielding. Unit is for individual, continuous, surface or pendant mounting.

Kenbert-Arpag Co., 520 Barretto St., Bronx 59, N.Y.



What this tag on OKOCORD portable cords and cables means to you

This "QC" (Quality Control) tag, the final one of a series, is Standard Operating Procedure for every length of OKOCORD before it is shipped out to you. It's your assurance that Okonite's modern equipment, skilled craftsmanship and overall Quality Control program combine to build more value into OKOCORD portable cords and cables.

Here are six other steps, typical of all OKOCORD manufacturing operations, where quality is constantly checked and maintained by the Quality Control Lab and every operator and supervisor in the plant.

1. QC Lab tests copper rod, raw materials against Research-developed standards to maintain uniform, high quality.
2. Strands are continuously drawn, annealed and steam cleaned with every run passed for size, strength, flexibility.
3. Compounds are mixed, milled, strained and refined in a continuous mechanized sequence to help eliminate error.
4. Microscopic examination of compound batches, in addition to physical and electrical tests, checks particle dispersion and authenticates compounding.

5. Latest type of continuous lead extruder eliminates damaging press stops in applying continuous mold for vulcanization—guarantee of OKOCORD's "tire-tread" toughness.
6. Okonite QC imposes the most rigorous tests in the industry, in process and final.

Each reel of OKOCORD bears this quality control tag. It's your assurance that the OKOCORD you buy will be a long-term investment. The Okonite Company, Passaic, N. J.

Buy through your distributor.

Write for this newly-published 64-page catalog on OKOCORD. Full information on construction components, cable assemblies, dimensional tables, engineering data plus splicing and terminating drawings and instructions.



where there's electrical power... there's **OKONITE CABLE**

6379

Reactors

(22)

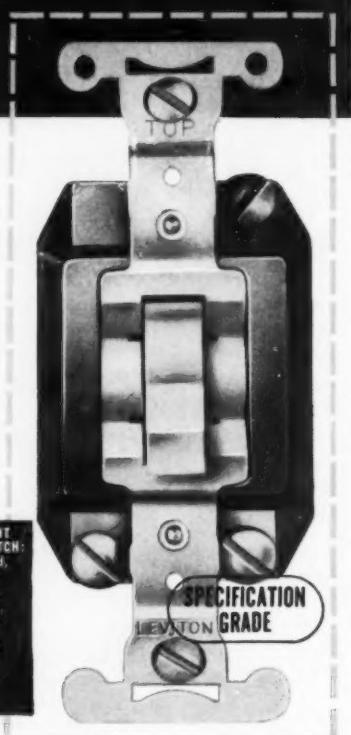
Saturable reactors to regulate and control electric power for various manufacturing processes. Any amount of ac power from 1 kva to 3000 kva, single phase or 3-phase, at any voltage, can be controlled, regulated and varied in stepless increments. Reactors can be connected directly to the distribution line or any other supply and can vary the output voltage from approximately 93% to 10% of the supply.

Sorgel Electric Co., 838 West National Ave., Milwaukee 4, Wis.

YOU DON'T NEED CAT'S EYES...TO SEE IT IN THE DARK.

LEV-O-LITE® ILLUMINATED HANDLE

silent mercury switch



No more fumbling in the dark . . . no more dirty walls from "switch-groping." Instead, a tiny, built-into-the-handle neon lamp that always remains bright, lasts a lifetime, and costs but a few cents a year to operate! This switch is sturdy, easy-to-install, with no moving parts to wear out, no springs to snap. Ideal wherever silence is essential . . . now popularly priced for every installation.

And . . . it's just one of the many fine, economical devices made available to everyone through the superior skills and complete resources of LEVITON!

For the complete story, write today on your letterhead.

All silent switches listed by U. L. and C. S. A.



Available boxed or carded.
Specify "K" when ordering
on card.

Your best jobs are done with . . .

LEVITON MANUFACTURING CO., INC., BROOKLYN 22, N.Y.

Chicago • Los Angeles • Leviton (Canada) Limited, Montreal

For your wire needs, contact our subsidiary AMERICAN INSULATED WIRE CORPORATION

LEVITON SILENT MERCURY SWITCH:
Fully enclosed, rated:
10A-125V-T.,
5A-250V,
Ivory toggle,
with illumination.
Single Pole
No. 5561 or
Three Way
No. 5563

LEVITON

Lighting Fixture

(23)

A new 45° by 45° shielded 2-lamp fixture has been added to the Luvex line. Known as Luvex-45, this model incorporates the same features as the other fixtures in this line. All louvers are interlocked with side panels and wireway cover. Finish is white enamel. Unit may be relamped without removing the enclosure. Luvex-45 is available in both 4- and 8-ft lengths with either slimline or rapid-start lamps. Fixture is for use in schoolroom, library or office installations.

Day-Brite Lighting, Inc., 6260 N. Broadway, St. Louis 15, Mo.

Conversion Kit

(24)

A kit for converting ampere ratings of all its high voltage tilting insulator switches. 200-amp 2ST or 3ST tilting insulator switches can be converted to either 400 or 600 amps. Switches rated at 400 amps can be increased to 600 amps. Conversion is possible because each of these switches, except for jaw assembly, is designed to meet NEMA standards for 600 amps. The ST switches use multiple beryllium copper jaw contacts, each rated at 200 amps. Upgrading a switch from 200 or 400 amps is done by mounting additional 200-amp jaw contacts on the pre-drilled jaw terminal plate. ST switches are available in voltage ratings from 7.5 to 34.5 kv.

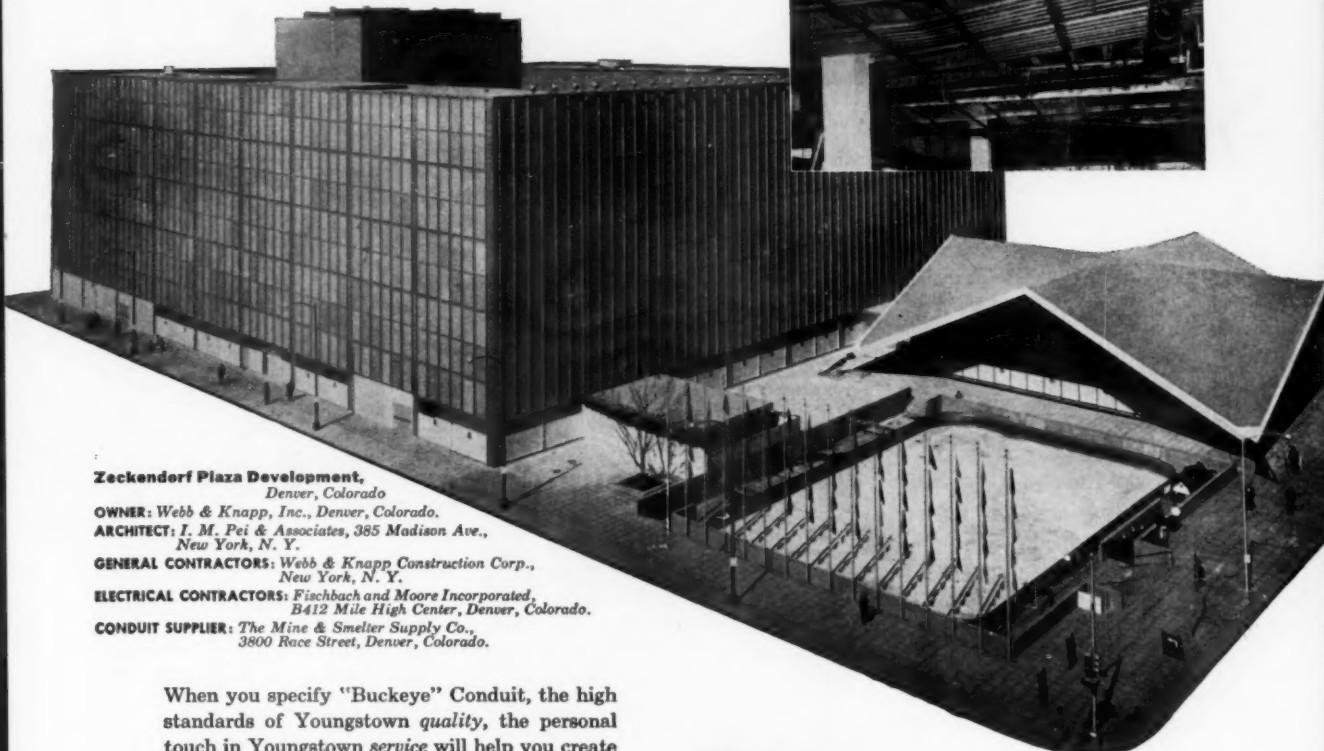
I-T-E Circuit Breaker Co., R&IE Equipment Div., Greensburg, Pa.

Accent on Excellence

Youngstown "Buckeye" steel conduit

This highly-functional modernistic department store building—only one of many new structures that will make up Denver's Zeckendorf Plaza Development—has built-in lifetime wiring protection, thanks to Youngstown "Buckeye" Full Weight Rigid Steel Conduit.

Damaging elements such as water, moisture, vapor, dust and dirt can never cause disruption of the building's all-important electrical system, because "Buckeye" Conduit will perform its protective function as long as the structure remains standing.



Zeckendorf Plaza Development,

Denver, Colorado

OWNER: Webb & Knapp, Inc., Denver, Colorado.

ARCHITECT: I. M. Pei & Associates, 385 Madison Ave., New York, N.Y.

GENERAL CONTRACTORS: Webb & Knapp Construction Corp., New York, N.Y.

ELECTRICAL CONTRACTORS: Fischbach and Moore Incorporated, 8412 Mile High Center, Denver, Colorado.

CONDUIT SUPPLIER: The Mine & Smelter Supply Co., 3800 Race Street, Denver, Colorado.

When you specify "Buckeye" Conduit, the high standards of Youngstown quality, the personal touch in Youngstown service will help you create electrical wiring systems with an "accent on excellence".



THE

YOUNGSTOWN

SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

Youngstown, Ohio

Installation of Youngstown "Buckeye" Conduit is shown during construction of the new May-D&F Department Store in Denver, Colorado.



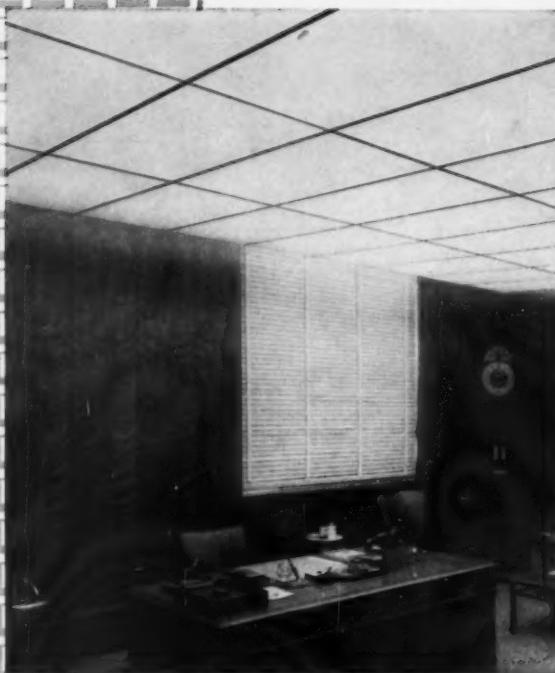
Carefully selected
Continuous Weld pipe

is first accurately threaded. Next, the pipe is thoroughly cleaned by pickling.

Then it is immersed in a bath of molten pure zinc. A special process is used to remove it from this bath so that a clean, smooth zinc coating remains on both inside and outside. Then a coating of tough, transparent lacquer is baked on both inside and outside surfaces, providing a smooth raceway through which wires may be easily fished.

This is Youngstown's long-lasting, trouble-free, easy-bending hot galvanized Buckeye Conduit.

**BE
SURE!**



Specify AMERICAN PLASTIC LOUVERS

THE OUTSTANDING LOUVER FOR ANY LIGHTING DESIGN.

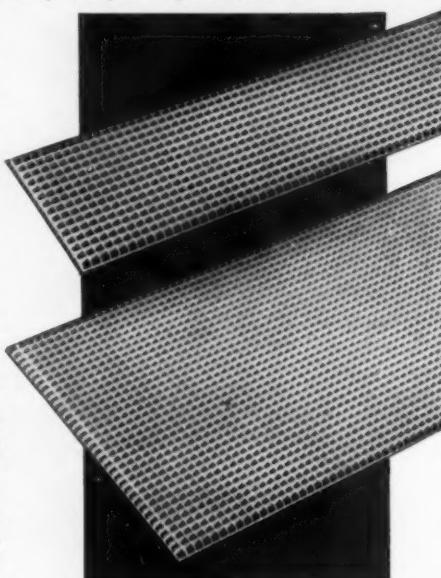
American Plastic Louvers offer the maximum in conformability for any lighting plan, whether it be industrial, institutional, commercial or retail. In application they may be employed in individual fixtures, full ceiling installations or any modular pattern. Strong, light weight louvers eliminate the need for costly heavy ceiling construction.

- Color-Stable.
- Restful shielding regardless of the light intensity involved.
- Light Weight—Specific gravity of only 1.05.
- Low Cost Maintenance — Easy to clean.
- Available in combination of sizes.

Only the exclusive process of the American Louver Company is covered by these patents:

USA Pat. No. 2,566,817
USA Pat. No. 2,607,455
Canadian No. 484,346
Canadian No. 497,047

The next time you order, specify the ultimate in modern plastic louvers—get AMERICAN!

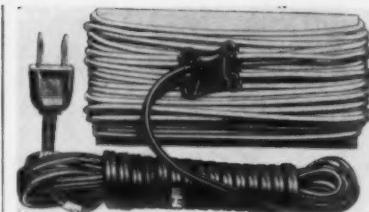


FEATURES:

Write for additional details.

american louver company

4240 N. SAYRE AVENUE • CHICAGO 34, ILLINOIS

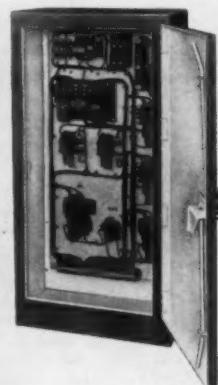


De-Icing Cables

(25)

De-icing cables for imbedding in the cement of walks, stoops and driveways and for heated slab brooders. Cables develop 5 watts per ft. To get the 30 watts per sq ft generally employed for de-icing, the cables are spaced 2 ins. apart. They are spaced on top of the concrete aggregate and imbedded in 1-in. to 1½-in. of finishing cement. Cables have a sealed waterproof connection to 10 ft of cold lead-in wire. The smallest size cable is 40 ft long and serves 6.6 sq ft of cement. A manual switch with pilot light should be used as a control.

Wrap-On Company, 355 W. Superior St., Chicago 10, Ill.



Control

(26)

A new full magnetic ac crane control system for light industrial jobs (NEMA Service Classification II). Designated Type VL, the control provides operators with greater freedom of movement on cab-operated cranes. Small masters can be mounted up front, and controllers at rear of cab. VL control is also available for cranes operated from floor by pendant pushbutton master. Type VL controllers are equipped with vertical-action contactors. Timed acceleration is provided for reversing hoist, bridge, or trolley controllers. Controllers have individual protection.

Electric Controller & Mfg. Co., Division of Square D, 4500 Lee Road, Cleveland 28, Ohio



METAL-CLAD SWITCHGEAR



HOW MUCH DO YOU NEED A HINGED REAR DOOR?

Some switchgear makers say you don't need it at all. They say you should struggle with a 75-lb. sheet metal cover and grope for the screw holes. That's good enough for you, they say.

But I-T-E gives you hinged rear doors as standard equipment on metal-clad switchgear—at no extra cost. And many other features besides. More solid construction throughout . . . means longer life. Sturdier enclosures to simplify installation. Finer finishes to give your whole switchboard a richer look. Examine an I-T-E switchgear installation. It is just plain better built. But you pay no more.

How much do you need I-T-E's double blowout coils—standard on 15 kv circuit breakers? Under all fault currents, here is extra protection, plus assurance of

longer circuit breaker life that no other switchgear offers you. Yet I-T-E charges you no more.

Recently I-T-E developed FLAMETRAP insulation that snuffs out flame in seconds and leaves no toxic fumes. It is today's most advanced flame retardant insulation—now yours on I-T-E switchgear for no extra cost.

This briefly is I-T-E's policy: to make its switchgear better, in construction, performance and appearance—but to charge no more. Why not make sure that you get all the value your switchgear dollars can buy. Get I-T-E switchgear. For a complete outline of our extra-quality features, write Switchgear Division, I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa. In Canada: Eastern Power Devices Ltd., Port Credit, Ont.



I-T-E CIRCUIT BREAKER COMPANY
PHILADELPHIA, PENNSYLVANIA

the best switch for all on-off circuit applications . . .



SANGAMO HEAVY-DUTY TIME SWITCHES

automatically control switching schedules in exact accordance with your specific needs

Put Sangamo Heavy-Duty Time Switches, equipped with astronomic dials, to work in your lighting installations. Years of dependable, accurate and trouble-free service prove these the best switches for all on-off circuit applications.

Sangamo's astronomic dial controls switching schedules automatically in exact accordance with sunset and sunrise, or off before midnight, if you wish. It compensates progressively day by day for the change in the length of daylight and is available for all latitudes.

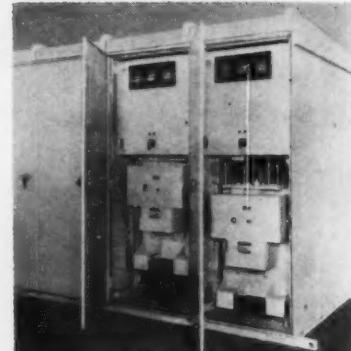
Only Sangamo Heavy-Duty Time Switches also offer the electrically-wound automatic carryover which keeps switch running for as long as 10 hours during power outages. No resetting or rewinding is necessary.

Your Electrical Wholesaler can furnish you with all types of dependable, accurate Sangamo Time Switches. See him, today, for full information.

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

Now is the TIME to SWITCH to SANGAMO

ST58-3



Switchgear (27)

Newly designed outdoor metal-clad switchgear with the complete control panel on the same side of the unit as the breakers. Available in ratings from 2.4 to 13.8 kv with interrupting capacities of 75 to 1000 MVA. All operating, testing and maintenance functions are performed from front of the unit. Two open compartments show exclusive vertical-lift design of magne-blast circuit breakers that give added safety, easier breaker handling. Breaker is connected in compartment at left, and disconnected in compartment at right.

General Electric Company, Medium Voltage Switchgear Department, Philadelphia, Pa.



Lighting and Heating (28)

A triple-lamp lighting fixture combined with an infra-red heater, called "People Heater" Model No. 5006. Designed for surface-mounted ceiling installation, this unit produces 180 watts of illumination through a patterned fiberglass drop bowl. The 750-watt infra-red heater offers "instant" heat. Fixture is prewired for wall switching of lamps. Heater, which contains three 250-watt infra-red heat lamps, is operated by a pull chain or 1-, 2-, or 3-lamp controls.

Emerson-Pryne Company, P. O. Box 698, Pomona, Calif.



4'-square PLEXIGLAS diffusers at Park Avenue office of a large New York City bank

PLEXIGLAS

...for lighting that stands out and stands up!

For lighting equipment that matches the beauty of a handsome interior, choose luminaires incorporating PLEXIGLAS® acrylic plastic. Then you can be sure of clean, uncluttered appearance, and highest efficiency in transmission and diffusion. You can also be sure these advantages will last, because PLEXIGLAS has freedom from discoloration, resists breakage, is a rigid material with a smooth, easily cleaned surface.

We will be glad to send you white translucent samples and a copy of our brochure, "Architectural Lighting with PLEXIGLAS".



Chemicals for Industry

**ROHM & HAAS
COMPANY**

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

Canadian Distributor: Crystal Glass & Plastics, Ltd., 130 Queen's Quay East, Toronto, Ontario, Canada.



STA-KON terminal

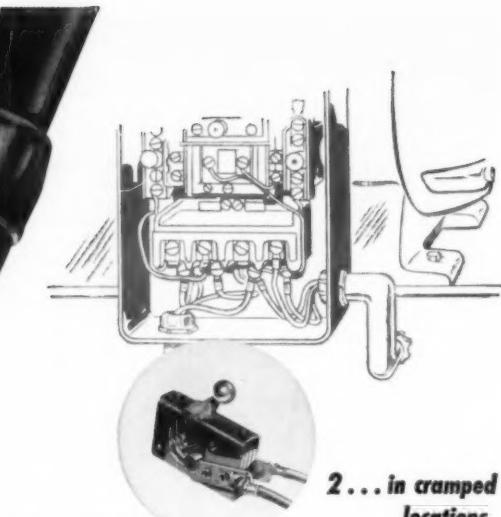
Self-insulated STA-KON terminal

How STA-KON pressure terminals save wiring time



I. T & B STA-KON terminals
are easy to install

Just one simple operation with a T & B SHURE STAKE® hand tool or production line tool and the job is done. Terminal and wire, either solid or stranded, are staked, under terrific pressure, to a near solid mass — all in a matter of seconds. Terminal barrel never relaxes its grip. Foolproof tool operation prevents improper installation — connections won't vibrate loose . . . can't fail under severe stresses.



2 . . . in cramped locations

STA-KON Junior Terminals are specially designed for fast hookups in confined areas, particularly on small blocks or where there is close spacing between barriers. Terminals are one-piece copper alloy with overall dimensions at a minimum. STA-KON Junior Terminals far exceed UL requirements for strength and conductivity. Both slotted and ring types available.



3 . . . or on product assembly lines

Portable or bench-mounted, air or foot-operated tools are available for high-speed production line work. All designed for a minimum of operator fatigue. No flame, heat or fluxing required to install T & B STA-KON Terminals.

Complete lines available in varied tongue styles and stud sizes with and without insulation grip. Wire sizes 22 to 4/0. Write for Bulletin 61.



LOOK FOR THIS SIGN —

IT'S THE MARK OF AN AUTHORIZED T & B DISTRIBUTOR

The complete line of T & B fittings for conductors and raceways is sold only by recognized electrical wholesalers. It's our way of assuring you the service and savings of a friendly local source. Call him for all your electrical needs.

THE THOMAS & BETTS CO.

INCORPORATED

34 Butler Street • Elizabeth 1, New Jersey

Thomas & Betts Ltd., Montreal, P.Q., Canada

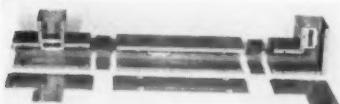
MANUFACTURERS OF FINE ELECTRICAL FITTINGS SINCE 1898



Fluorescent Fixture (29)

Fluorescent lighting fixture, called "Slimfin", features side "Finglow" light beams. "Finglow" side wing edges are molded of polystyrene plastic, and are securely seated in the unit's steel side wings. Fixtures are finished in white Permalux and include chrome end fins. Units are available with Gratalite louver diffuser, Prismoid Gratalite or metal cross baffle bottoms. They are for close ceiling or pendant mounting, as individual units or in continuous row installations. Available in 4- and 8-ft lengths, in 2- or 4-light widths. Listed by UL. Bulletin is available.

Edwin F. Guth Company, 2615 Washington Blvd., St. Louis 3, Mo.



Wiring Trough (30)

New 2½-in. by 2½-in. wiring trough is available in 1-, 2-, 3-, 4- and 5-ft lengths with fittings, such as end caps, 90° internal elbow, tee connectors and "U" connectors. Each foot of trough has the same knockout arrangement, four ½-in. and ¼-in. concentric knockouts, 3-in. on center on two opposite sides of the trough. Covers have keyhole slots. Troughs and fittings are finished in baked blue-gray enamel.

Wadsworth Electric Mfg. Co., Inc., Covington, Ky.

Cable Clamp (31)

A new cable clamp designed to secure armored cable in ladder cable supports. It is available in both galvanized steel and aluminum, and fits cable from ½-in. up to 8½-in. diameter. Clamps may also be used to secure several small cables together. Rungs of Cope cable ladder are suitably slotted to receive the cable clamp that is secured by a bolt. Clamps not only provide support for cables in vertical runs but also keep cables segregated.

T. J. Cope Division Rome Cable Corp., Collegeville, Pa.

EFFICIENCY IS HIGH

when your tool is a

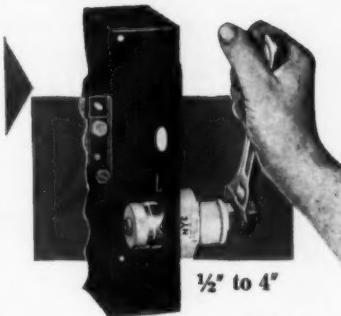


Fifty years of know-how are behind its design and construction. NYE tools are known the world over for dependable performance. What's more, NYE tools are all guaranteed.

Original 4 POINT KNOCKOUT PUNCH

Hand or Hydraulic Operated

Fastest burrless punch on the market. Easiest to use, slugs drop out without prying.



NYE 51B

RATCHET PIPE THREADER

Has all the important features. ORIGINAL JAMPROOF DESIGN. Fast rewind knob. Ask for demonstration.



NYE 2NP

HEAVY-DUTY PIPE CUTTER

Self aligning—eliminates spirals because of original out-rigger design. Note: Long sleeve for protecting thread of tool when using a power unit.



5 NEW PIPE VISES

with built-in bender and pipe rest.

Full range of sizes ½" thru 4½".

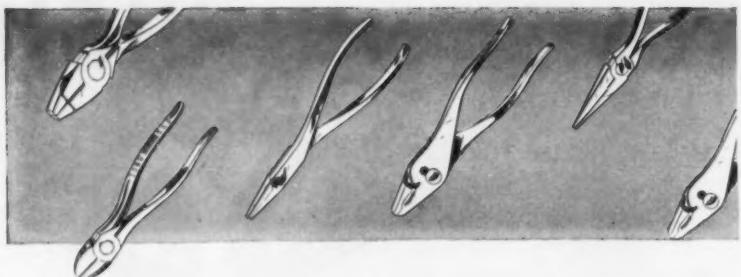


Write for NYE catalog showing the complete line
NYE TOOL COMPANY
4126 W. Fullerton Ave.
Chicago 39, Illinois

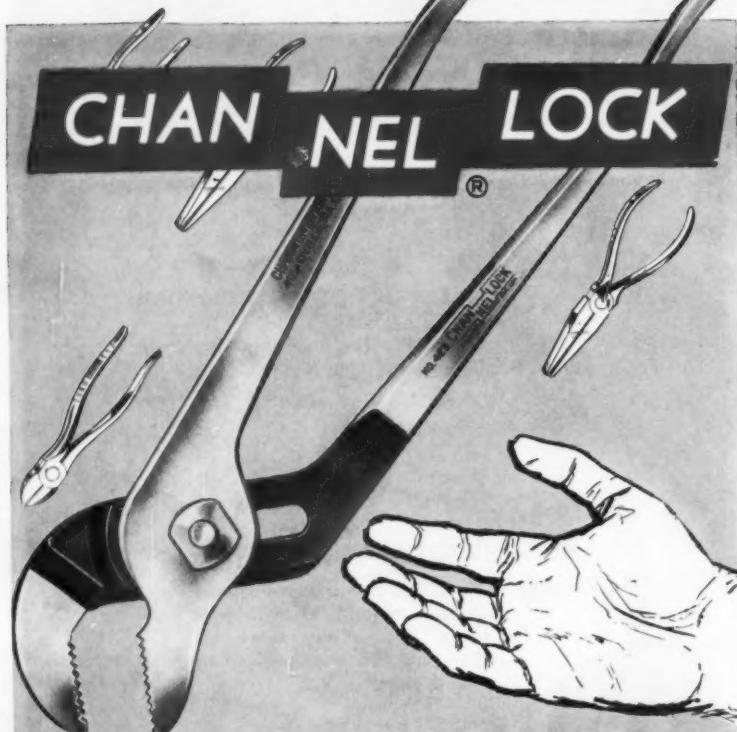
Name _____
Company _____
Address _____
City _____ State _____

NYE TOOL COMPANY

4126 WEST FULLERTON AVE. CHICAGO 39, ILLINOIS



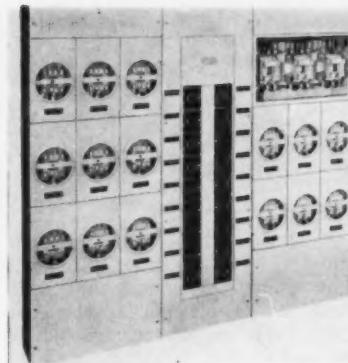
skilled hands
reach for...



Skilled mechanics . . . thousands of them every year . . . reach for and buy Channellock pliers. Why? Ask them. They'll tell you they like the positive gripping power...the rugged strength...the precision balance...the all 'round handy "feel" of these quality pliers. And you will, too!

CHAMPION DEARMETT TOOL COMPANY
MEADVILLE, PENNSYLVANIA

ASK YOUR TOOL SUPPLIER
FOR *Genuine CHANNELLOCK PLIERS*



Panelboards (32)

New meter socket panelboards combine any number of individual apartment circuit breakers and meter sockets into one compact assembly. Panelboards are custom-assembled at plant to fill the requirements of each project. Pull-type switches can be substituted for circuit breakers if desired.

*Frank Adam Electric Company,
3650 Windsor Place, St. Louis 13,
Mo.*

Lighting Fixture (33)

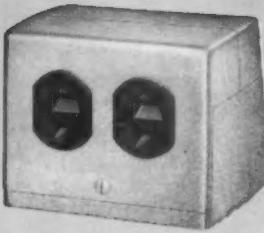
A 200-watt open suburban lighting fixture for illuminating farm work areas, outbuildings, storage areas and driveways. The 4,000-lumen incandescent unit is equipped with an integral photoelectric control device that makes possible automatic dusk-to-dawn farmstead lighting. Unit has a die-cast aluminum hood with integrally-east side mounting, and a 1½-in. slipfitter mounting, in addition to the plug-in photoelectric control. It is equipped with internal binding posts for wiring through the bracket.

General Electric Company, Schenectady 5, N. Y.

Tool (34)

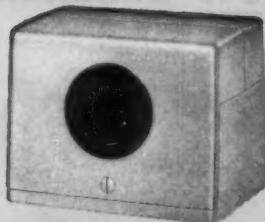
Powder-actuated fastening tools called "Flite-Chek", prevents an overdriven fastener from accidentally being fired through a weak spot in a wall or of a ricochet. Flite-Chek utilizes the power generated by firing a cartridge to sink a fastener into a variety of non-brittle materials. Unit operates the same way as other Ramset powder-actuated tools. Flite-Chek is designed for both threaded studs and drive pins.

Ramset Fastening System, Olin Mathieson Chemical Corp., 460 Park Ave., New York 22, N. Y.



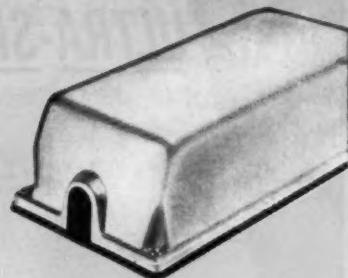
STANDARD POWER FITTING

Will accommodate all known receptacles up to 50 amps



CUSTOM TELEPHONE FITTING

Will accommodate from one to three Western Electric 44-A terminal blocks

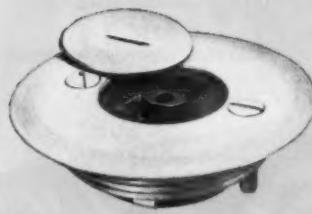


MULTIPLE TELEPHONE SERVICE FITTING

Will accommodate up to six Western Electric 44-A terminal blocks and one buzzer



ABANDONED OUTLET PLATE



FLUSH FLOOR SERVICE FITTING



STANDPIPE FITTING

THE BEST YOU CAN BUY! SPANG SERVICE FITTINGS

NEWEST DESIGNS

All fittings are of engineered design to incorporate latest styling and easy-working features.

FAST INSTALLATION EASY ADJUSTMENT

Easy to wire. Extra-roomy design provides ample working area and space for excess wiring. Fittings adjust quickly into place.

COMPLETE LINE

There's a SPANG Service Fitting for every type outlet. Your choice of high-lustre brass or brushed aluminum.

INTERCHANGEABLE

SPANG Fittings are easily adapted to other underfloor duct systems. Exclusive SPANG Adapter assures fast installations.

LONG SERVICE LIFE

Once installed, SPANG Fittings can't

twist or turn. Exclusive neoprene gasket seal makes fittings watertight.

MAKE SPANG YOUR FIRST CHOICE!

SPANG Standard Underfloor Duct and SPANG Industrial Duct for use with conventional slab construction, and SPANG Headerduct for use in cellular floor construction offer many time-saving advantages. Available through SPANG Distributors all across the country. Write for complete information.

SPANG-CHALFANT

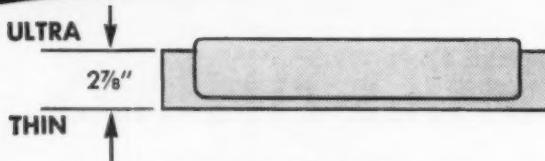
DIVISION OF THE NATIONAL SUPPLY COMPANY

General Sales Office: 2 Gateway Center, Pittsburgh 30, Pa.
District Offices and Sales Representatives in Principal Cities

New ULTRA-SHALLOW Luminaires



"Skylark"



Graceful, Ultra-Shallow Styling Creates a Smooth, "New Look" in Lighting Appearance

The Mitchell SKYLARK luminaire has a modern thin-line appearance combined with unusual high efficiency and low maintenance features. Pleasing, graceful styling, quick, easy, low cost installation features makes this attractive luminaire ideal for use in offices, commercial areas, shopping centers and schools. The SKYLARK is available in 2-lamp and 4-lamp matching units designed to provide abundant glarefree illumination.

Mitchell

MITCHELL LIGHTING COMPANY
DIVISION

COMPAC CORPORATION
1800 N. Spaulding Ave. • Chicago 47, Ill.



Twin Switch

(36)

A new twin switch has been added to the line of Feathertouch lifetime switches. Designed for use where space is limited, the new switch incorporates two single pole switches with one wallplate and permits installation where there is not sufficient room for two switch boxes. It has the same features as other switches in the Feathertouch line, including rocker-arm action, quiet operation, silver contacts.

*H. J. Theiler Corp., Whitinsville,
Mass.*

Motor

(37)

A new weather-protected vertical motor intended for outdoor operation under all weather conditions including hurricane winds, driving rain, snow, sleet and wind-blown sand. Motor meets NEMA Type II weather protected specifications and is manufactured in ratings from 250 to 2000 hp, in both hollow shaft and solid shaft construction. Motor is cooled by ventilating air taken from the surrounding atmosphere. Motor contains the new MGL insulation system that incorporates Mylar, Glass and Lecton with a thorough impregnation of tera-phenolic insulating varnish. Bulletin No. 2600 is available.

Louis Allis Co., Milwaukee 1, Wis.

Terminal Blocks

(38)

Terminal blocks now feature a unique spring-mounted circuit identification strip. Three-pronged spring clips are affixed to each end of the terminal block by standard mounting screws. The marking strip is snapped on by hand. In this flexible design the strip may be positioned to expose either row of terminal screws, or may be center-mounted for installations where both rows of terminals should be readily accessible.

*Marathon Special Products Corp.,
12th and Cranberry Sts., Erie, Pa.*

Transformers

(39)

A new line of open dry-type transformers using aluminum in all current-carrying components to provide quieter and lighter-weight units for commercial and industrial service. Available in ratings from 300 to 2500 kva. A feature of transformer includes a substantial weight reduction allowing greater application flexibility. Designed primarily for commercial use, the field-tested units offer increased value in terms of lower losses and lower sound levels.

General Electric Co., Schenectady 5, N. Y.

Converters

(40)

Two-bearing 400 cycle frequency converters to meet demands of aeronautical component manufacturers and other industries for 400 cycle testing current. Exciter armature is of the sleeve type and fits over an extension of the main alternator shaft. A combination motor and generator control cubicle which can be conveniently wall or bench mounted, is usually supplied with the machines, although free standing floor cubicles and motor-generator mounted panels can be supplied. Panel above includes motor starter, automatic output voltage regulator, ammeter, voltmeter, frequency meter, manual regulator adjust, exciter field rheostat and selector switch with necessary current transformers, relays and laced circuitry. All meters and controls are mounted on heavy gauge sheet steel dead front door. Literature is available.

Kato Engineering Company, Mankato, Minn.

Lighting Fixture

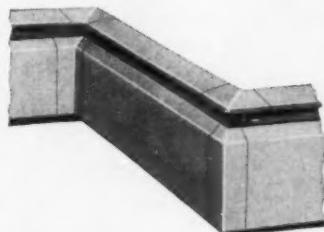
(41)

A wide variety of shapes, finishes and mounting arrangements is featured in the new line of "Accent" fixtures. They are designed to provide illumination in specific areas in homes, stores, offices, showrooms, display windows, convention exhibits, and many other locations. Four basic shapes are available—step cone, straight cone, and small and large "bullet" shape, for stationary or swivel mounting on walls and ceiling. Complete line comprises 19 different 1-light and 2-light models, with capacities of 60 to 150 watts.

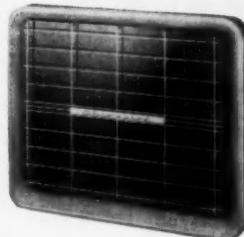
Markstone Manufacturing Co., 1531 North Kingsbury St., Chicago 22, Ill.

ELECTRIC HEAT . . .

**Are you growing with
this fast moving market?**



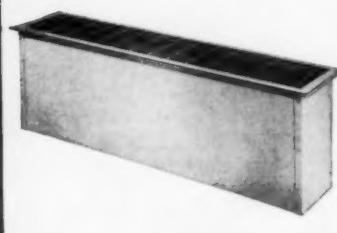
Chromalox Baseboard Heater



Chromalox
All-metal Radiant Panel



Chromalox
Electric Unit Ventilator



Chromalox Floor Drop-in Heater

**Cash in with CHROMALOX
the complete quality line**

No doubt about it — electric heat is winning acceptance everywhere. In homes, churches, factory offices, schools, motels — in fact everywhere that comfort heat is needed.

Not only new structures, but existing structures, use this modern method of heating. And this doubles your market.

Electric utilities, too, are devoting promotional time to developing this huge market. Are you tying in?

Why not learn the electric heating story now? Write for full details. You'll

find nation-wide distribution and local Chromalox engineering assistance to back your efforts.

You'll like the Chromalox line, too — renowned for quality the world over, yet it costs no more. With quality, there's customer satisfaction, without call-back for you. Long life, fast installation, attractive appearance — are all in your favor with Chromalox.

See our complete line in Sweet's catalog. Write for details now — so that you can heat better — electrically.

2663

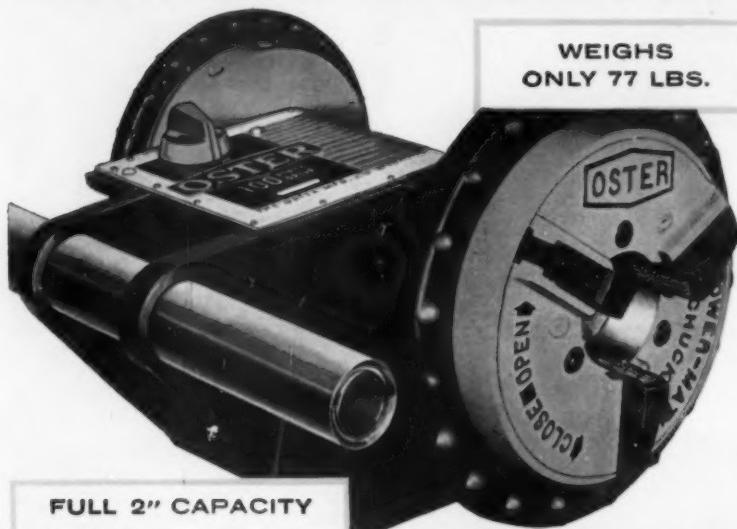


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Electric Heat

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OSTER

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OSTER

Builders of
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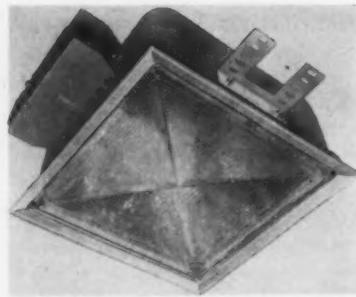
For other Models
write for General Catalog

... complete with NEW "POWER-MATIC"
FRONT CHUCK including REPLACEABLE
INSERT CHUCK JAWS ... SELF-CENTER-
ING REAR CHUCK ... POWERFUL
HEAVY-DUTY REVERSIBLE MOTOR.

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or Write Today!*

THE OSTER MANUFACTURING COMPANY • 1313 East 289th St., Wickliffe, Ohio



Lighting Unit

(42)

Uni-Frame, a new recessed incandescent lighting element features a single frame $\frac{1}{8}$ -in. thin, and a lens area for a 12-in. square opening. Model 200 handles 100-, 150- and 200-watt lamps, Model 300 takes 300-watt medium base lamps. The Pyrex lens, $11\frac{1}{8}$ ins. square, features "Bifocal" prism design. Frames are available in flat white enamel, anodized aluminum in brass or natural aluminum. A rigid seamless box can be installed in poured concrete. Uni-Frame is designed to replace one 12-in. square ceiling tile, installs in all types of ceiling construction and can be adjusted to compensate for ceiling thickness.

Day-Brite Lighting, Inc., 6260 N. Broadway, St. Louis 15, Mo.



Battery Charger

(43)

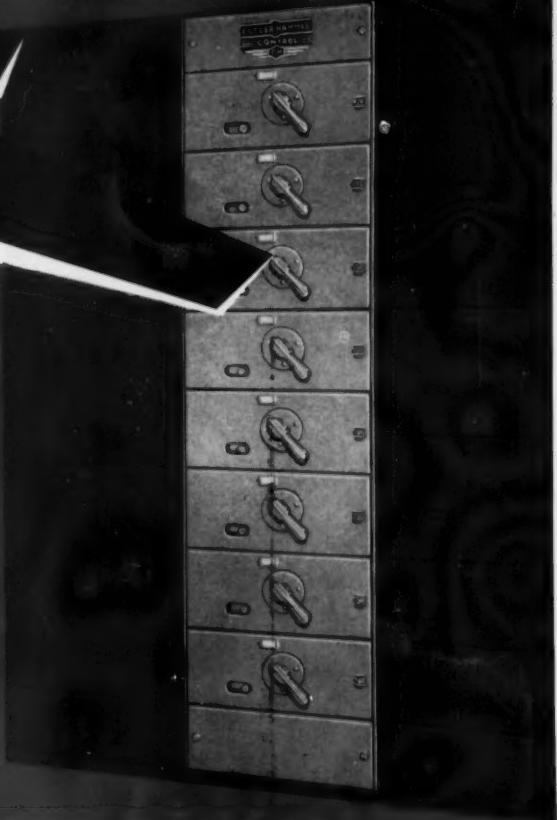
New vertical motor-generator chargers for electric industrial truck batteries. Saving floor space by utilizing vertically-mounted motor and more compact design, the fully-automatic Electric Products chargers also provide users with a wide choice of electrical ratings, permitting better matching of charger to individual battery requirements. The EP chargers come in four different physical sizes, yet provide a choice of 25 different ratings, ranging from 0 to 800 amp-hrs. They have 2, 3 and $7\frac{1}{2}$ hp ratings and are designed for 2- or 3-phase 60-cycle operation at 220, 440 or 550 volts.

Exide Industrial Division, Electric Storage Battery Company, Box 8109, Philadelphia 1, Pa.

Looking for
Something

EXTRA!

New 8-Hi Unitrol[®] saves
valuable space without
sacrificing Structural Stability,
Flexibility, or
Installation Simplicity

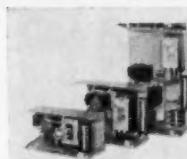


8-Hi Unitrol packs more control into less space

For true space-saving economy, install the new Cutler-Hammer 8-Hi Unitrol. Now each side of a single Unitrol Section will hold eight size 1 control units . . . or five size 2 units . . . or four size 3 units. And these control units are NOT restricted to just the minimum number of components. New compact unit design provides extra space for optional components such as a control transformer, control circuit fuses, terminal boards, three-coil overload relay, and push-buttons and indicating lights.

8-Hi Unitrol is built better to last longer

The new 8-Hi Unitrol is first to achieve a truly compact design without sacrificing structural stability. 8-Hi Unitrol retains all the extra construction features which earned Unitrol the reputation for outstanding ruggedness and dependability. Make your own comparisons and you'll agree 8-Hi Unitrol is built better . . . will last far longer.

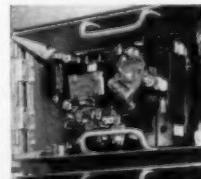


8-Hi Unitrol offers extra control center flexibility

Here's extra value at no extra cost. 8-Hi Unitrol Control Units are available in both the standard and the new compact design for greater selectivity and flexibility. Add to this the modular unit construction and see how 8-Hi Unitrol not only affords greater space-saving, design flexibility, but also simplifies on-the-job modifications to keep pace with the user's changing control requirements.

8-Hi Unitrol is easier and safer to install

Available in type A, B, and C construction with class 1 or 2 wiring, you can choose the 8-Hi Unitrol that affords the greatest installation economy. U-shaped plug-in control units eliminate buried components . . . provide wide-open accessibility and visibility. Exclusive "safety-lock" test position insures safe assembly, wiring and testing of every control unit. Plug-in power contacts are self-aligning . . . eliminate hazardous manual adjustments.



Be sure you have all the facts on the new Cutler-Hammer 8-Hi Unitrol today . . . its many extra features assure you easier, more economical installations; and longer lasting, trouble-free operation for its user. Write now for the new descriptive Bulletin EN142-V-241.

CUTLER-HAMMER Inc., Milwaukee 1, Wisconsin.



CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wis. Division: Airborne Instruments Laboratory. Foreign: Cutler-Hammer International, C. A.

Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.; Intercontinental Electronics Corporation, Inc.

BRONCO

Certified

66

electrical cord flexed
300,000 times without failure!

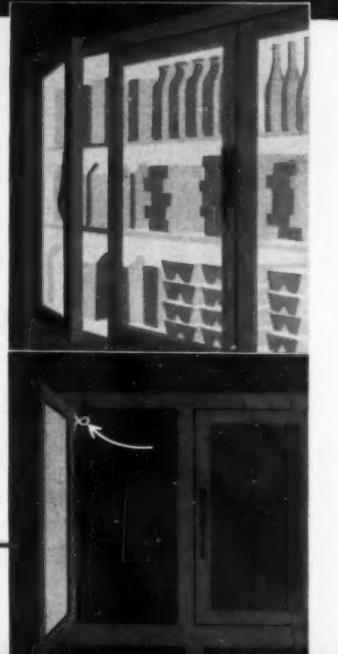
WEBER SHOWCASE AND FIXTURE CO., INC., largest manufacturer of refrigerated display cases and market equipment in the west, required an extremely flexible electrical cord for a new reach-in refrigerated dairy and beverage case.

The cord is twisted and flexed through a 100° angle each time the door is opened. Again, each time it is closed.

Specifications called for a piece of #18, 3 conductor, type SJO cord that would withstand 50,000 cycles.

A piece of BRONCO 66 Certified Type SJO, procured from stock, was placed in the electrically driven test mechanism.

The BRONCO 66 Certified cord was flexed through 150,000 cycles! — 300,000 bends and twists! — three times more than the specifications called for! The test was discontinued. No failure, no apparent damage to conductors or jacket; the wire still operated perfectly. NO OTHER CORD TESTED CAME EVEN CLOSE TO THIS!



Here's why BRONCO 66 Certified won the Weber flex test. Bronco 66 Certified has an outer protecting jacket that contains more Neoprene—57.32% of Dupont Neoprene. Copper strands are annealed electrically. Bronco 66 Certified is Syncro-Cured. Vulcanization of the insulation is synchronized with vulcanization of the jacket.

For rough, tough applications specify Bronco 66 Certified—it's rugged, longer-lasting, more flexible, with greatest flex life.

Write for new quick reference catalog of

BRONCO 66 Certified Big Cables

WESTERN INSULATED WIRE CO.

Ceilings

(44)

Luminous pastel-colored ceilings for use in stores, hotels, hospitals, banks and offices. Called Colorceil, the lighting system provides high levels of illumination with complete comfort while permitting luminous ceiling color design in almost unlimited range. It hides all structural ceiling details, such as beams, pipes and air conditioning vents. Any desired level of lighting between 100 and 250 footcandles can be achieved, by arrangement of 2-lamp units and the use of three different types of high intensity fluorescent tubes, including the Power Groove lamp. The lamps may be used individually or in combination. Initially, plastic panels in yellow, pink, blue and green will be available.

Silvray Lighting, Inc., Bound Brook, N. J.

Fastening Device

(45)

Four new anchoring and fastening items have been added to this line, including a caulking anchor for machine screws specifically designed for use in hard, brittle material. A lag screw expansion shield made of hard zinc alloy makes for easier installation. A wood screw anchor with a tapered rectangular hole for a sidewise shearing action gives greater holding power. A spring toggle bolt has zinc plated double wings that lock tightly to a screw under pressure and prevent loosening by vibration. Items come in all standard sizes.

Blackhawk Industries, Inc., Dubuque, Iowa.

Interrupter Switch

(46)

High-speed opening and closing are now standard operating feature of HPL-C metal enclosed interrupter switches. Tog-L-Snap permits closing an unfused switch against 3-phase faults up to 250,000 kva, at 13.8 kv, with negligible damage. Tog-L-Snap now makes the line of HPL-C switches ideal for applications such as loop circuit switching. Switch is particularly useful for power switching centers to provide reliable, low-cost switching and fault protection for industrial plants, institutions, schools, airports and similar facilities. Switches are available in ratings of 600, 1200 and 2000 amps at voltages of 4.8, 7.2, 13.8 and 14.4 kv.

R&IE Equipment Division, I-T-E Circuit Breaker Co., Greensburg, Pa.



Drives (47)

A complete line of packaged motor-generator type adjustable voltage drives. Combining the convenience and economy of ac power with the versatility of dc power, drives are furnished with standard speed ranges up to 8 to 1 by armature voltage control. Transistors, combined with magnetic amplifiers and metallic rectifiers, make these drives reliable. Adjustable speed drives are available in ratings from 3 to 200 hp for single or multi-motor applications. Bulletin SM-280 is available.

Square D Company, 4041 North Richards Sts., Milwaukee 12, Wis.

Bathroom Heater (48)

New No. 3100 electric bathroom heater is a surface-mounted unit of polished anodized aluminum construction. Radiant glass panel features a Corning Glass Pyrex heating element, and is protected by a polished grill that will not heat up. A built-in thermostat allows exact temperature selection. Available in 120 or 240 volts; 2650 Btu's per hour. Size is 13½ ins. wide by 17½ ins. high by 3 ins. deep.

Allied Precision Industries, Inc., Geneva, Ill.

Electric Plant (49)

New electric plant, Model 35R81, is a 35 kw, 120/208-vac unit equipped for remote starting. It is a 12 lead, reconnectable revolving field type with direct connected exciter and automatic voltage regulation. Generator is built to ASA and NEMA specifications. Voltage regulation is within plus or minus 2%, frequency regulation 3 cycles. Unit is recommended as a standby power source for hospitals, municipal buildings, large green houses, hatcheries, stores, lodges, camps, office buildings, and airports.

Kohler Co., Kohler, Wis.

ELECTRICAL CONTRACTORS!

Use this fast portable trencher for cable, pipe, tubing, conduit

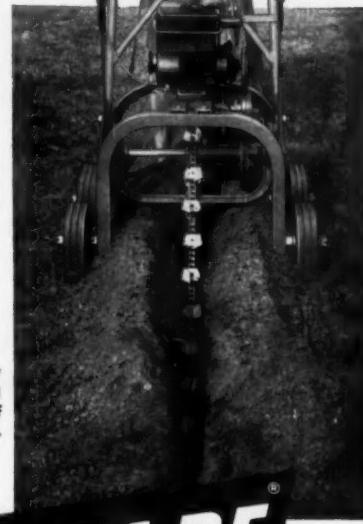
POW-R-SPADE narrow trenches cost 1c to 5c per foot including labor.

Saves 80% - 90% cost and time compared to subcontract or hand digging.

Ready to go on the job, at once — no costly waiting around.

Can pay for itself in one day's operation.

POW-R-SPADE digs a neat 3" wide trench. Dirt is delivered well pulverized on each side of trench — no lumps or clods. Easy to back fill.



STAMPINGS

POW-R-SPADE

MADE BY STAMPINGS, INC.
Davenport, Ia.



Portable from job to job.
Easily handled by one man.



APPROVED and recommended by hundreds of users in every area of the United States.

Get more facts about the earning power of POW-R-SPADE. ▶

We ADMIT that these are strong statements. And yet, POW-R-SPADE users confirm them again and again. For here is a machine that is ideal for trenching 3" wide to 24" deep, where larger machines are costly and impractical; where hand labor is slow and expensive. No heavy wheel marks or unnecessarily wide trench to scar lawns. Digs right up to foundation of building. Goes 1½ to 17 feet per minute, depending upon soil conditions.

A rugged machine. Easy to set and to operate. Oil-sealed bearings. Powered by a well-known engine. Minimum maintenance. Shipped completely assembled, ready to go to work for you. Additional interesting details and information immediately yours upon return of the coupon.

Stampings, Inc., 1017½ Mound St., Davenport, Iowa
Please send material on POW-R-SPADE to:

Name _____

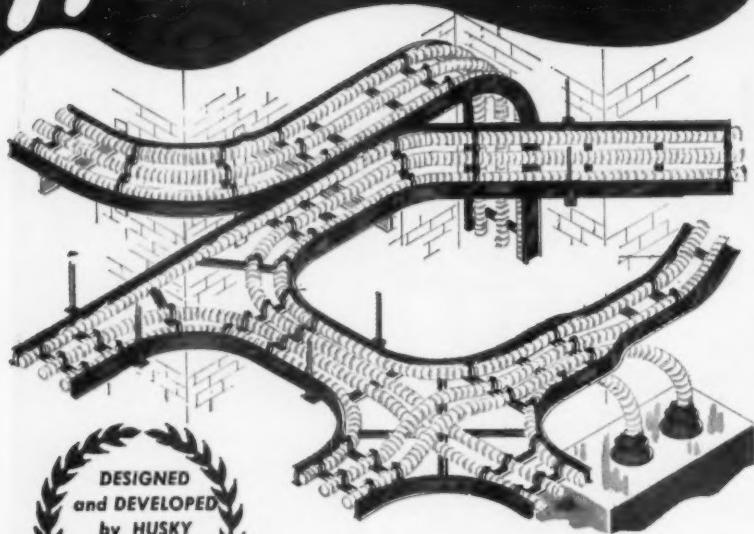
Company _____

Street _____

City _____ State _____

HUSKY

FOR POWER and
CONTROL CABLES IN-FREE-AIR



Each cable carrier type listed below is made from high strength, corrosion resistant aluminum alloy extrusions or roll formed steel, hot dip galvanized after fabrication. Companion fittings (bends, tees, etc.) are available to make a complete multi-directional installation.

HUSKY CABLE RACKS

USE: Support of multiple power and/or control cables.

DESCRIPTION: All-welded construction. Cross rungs on 18 inch centers. Furnished in two (2) depths for 12 or 20 foot spans. Lengths up to 24 feet.

HUSKY CABLE TROUGHS

USE: Support of individual power and/or several control cables.

DESCRIPTION: One piece construction. Lengths up to 16 feet.

HUSKY A SINGLE SOURCE OF SUPPLY

Auxiliary to the basic cable carrier types Husky Products offer a wide range of accessory materials which include:

- A. Component parts for cable carrier support assemblies.
- B. Long span support (channel beams, towers, etc.)
- C. Cable fastening devices (clamps, insulator blocks, etc.)
- D. Cable installation tools (EZ rolls, triple pulleys, etc.)

Write NOW for FREE Complete CATALOG and ILLUSTRATED BROCHURE!



HUSKY

Rectifier

(50)

A 50 kw heavy duty silicon rectifier type dc power supply for hoists and cranes. Unit is used in steel mills, mines and similar applications and is designated Model No. M-1148 and has a rated output of 230 volts, 200 amps dc, with an overload rating of 400 amps for one minute and 250 amps for 30 minutes. Unit operates from a 450-volt, 3-phase, 60-cycle ac input line. Controls on unit include an air circuit breaker in the ac circuit with overload protection, pilot light, and dc ammeter with 0 — 200 amps scale.

Perkin Engineering Corp., Heavy Duty Rectifier Division, 345 Kansas St., El Segundo, Calif.

Enclosures

(51)

New liquid-tight "JIC" terminal and pull box enclosures designed to meet the electrical requirements of the Joint Industry Conference standards. Boxes are for use as panel and instrument enclosures as well as electrical pull boxes and terminal wiring boxes on a wide range of applications where wiring must be protected against dust, dirt, water, oil and coolants. "JIC" boxes are available in eight standard sizes ranging from 4- by 4- by 6-in. to 16- by 14- by 6-in., and the panels for mounting chassis, terminal strips, relays and other components come in corresponding sizes for insertion in the enclosures.

Keystone Manufacturing Co., 23328 Sherwood Rd., Warren, Mich.

Receptacles

(52)

A new addition to the Arktite line of circuit-breaking receptacles is the dust-ignition-proof DR Series. Circuit making and breaking contacts are completely enclosed. Front contact assembly must be fully engaged by plug before it can be rotated and moved to engage the rear contacts, completing the circuit. Plug cannot be withdrawn until front assembly has been disconnected from rear assembly, and rotated to starting position. Both Style 1, grounded through shell, and Style 2, grounded through extra pole and shell, are for use in Class II, Group G hazardous locations. They are available with two, three and four poles. DR Series receptacles are listed with DFP plugs for 20-amp receptacles, and with APJ plugs for 30-amp receptacles.

Crouse-Hinds Company, Syracuse 1, N. Y.

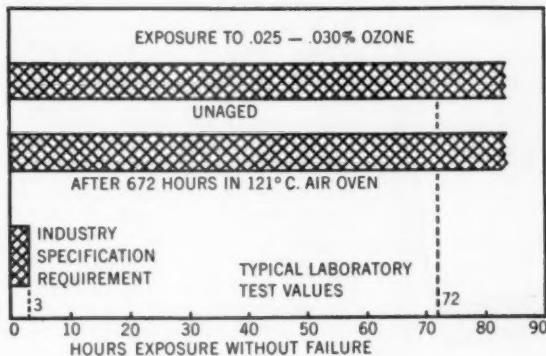
10 TIMES MORE INSULATION RESISTANCE WITH KAISER ALUMINUM HIGH VOLTAGE KALZONE INSULATED CABLE!



A year-long analysis of 393 full-length reels of Kaiser Aluminum Kalzone insulated cable showed that more than 93% of the lengths tested exceeded an insulation resistance constant "K" of 100,000... ten times greater than current IPCEA requirements of 10,000!

More than 5% of the balance tested exceeded a 50,000 "K," and ¾ of 1% fell between 25,000 and 50,000.

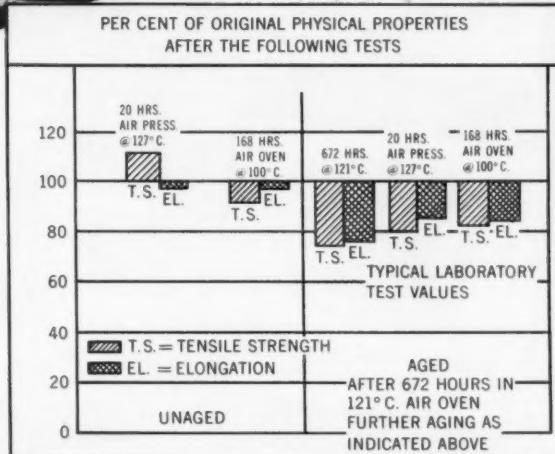
Laboratory tests prove Kalzone provides best protection against ozone, heat, moisture



OZONE RESISTANCE

Unaged—Withstands more than 72 hours in .025-.030% ozone without failure.

Aged—Still withstands more than 72 hours in .025-.030% ozone without failure after 672 hours in a 121°C. Air Oven.



HEAT RESISTANCE

Unaged—Practically unaffected by Air Pressure or Air Oven Tests.

Aged—Actually improves in per cent of original tensile strength and elongation in Air Pressure and Air Oven Tests, after 672 hours in 121°C. Air Oven.

MOISTURE RESISTANCE

MECHANICAL

Unaged—Less than 5 milligrams absorption in standard Gravimetric 7-day Test. (IPCEA, 15 mgms.)

Aged—After 672 hours in a 121°C. Air Oven, less than 7 milligrams absorption.

ELECTRICAL

Unaged—Less than 2% increase in Capacity in 1-14 day EM-60 Test. (IPCEA, 5%).

Aged—After 672 hours in a 121°C. Air Oven, less than ½ of 1% increase in capacity in 1-14 day EM-60 Test.

Kaiser Aluminum Kalzone insulated high voltage cable is laboratory tested and quality controlled during actual production to assure *proved quality* with every reel. Get full details on this low cost, lightweight aluminum power cable now. Contact the Kaiser Aluminum sales office listed in your telephone directory.

Kaiser Aluminum & Chemical Sales, Inc., 919 N. Michigan Avenue, Chicago 11, Illinois.



IF IT CARRIES CURRENT, K.A. CARRIES IT!

TRADEMARK OF SAFETY

ELECTROMODE
All-Electric HEATERS

Mr. Safety Grid

Only Electromode Heaters have the Safety Grid—a cast-aluminum heating element with all electric wires completely sealed inside. Provides full protection against fire, shock or burn.

► EASY TO INSTALL
► NO CALL BACKS
► SATISFIED USERS

All Your Requirements from One Reliable Source

Electromode Heaters Are Made in More Than 100 Different Models. Write for Full Information.

ELECTROMODE BASEBOARD HEATERS

ELECTROMODE WALL-TYPE BATHROOM HEATER

ELECTROMODE WALL-TYPE DOWN-FLO HEATER

ELECTROMODE RADIANT CABLE HEAT

ELECTROMODE PORTABLE and SUSPENSION HEATER

ELECTROMODE EXPLOSION-PROOF HEATER

ELECTROMODE SUSPENSION-TYPE HEATER

ELECTROMODE division, Commercial Controls Corporation
DEPT. ECM-108 **ROCHESTER 3, N.Y.**

Angle Gauge

(53)

No. 1802 angle bending gauge saves time in bending pipe and conduit. A special notched protractor design allows the exact degree of bend to be locked in. Made of durable zinc plated steel with black figures, the gauge has an overall length of 70½ ins.

Greenlee Tool Co., 2136 Twelfth St., Rockford, Ill.

Tape

(54)

For the protection of water pipes six new long Wrap-On tapes are available. They range in length from 30 ft to 200 ft. Tapes include 2 ft of cold lead in wire with waterproof connection so that all heat is confined to the pipe.

Wrap-On Company, 355 W. Superior St., Chicago, 10, Ill.

Mercury Lamp

(55)

A new 400-watt 3.2-amp mercury-lamp for street and highway lighting systems which operate on straight-series circuits. Lamp has a built-in protective device against sudden surges of voltage through line. This internal "cutout" eliminates the necessity for maintenance trips to replace presently used external film circuit cutouts after heavy electrical storms or other sudden surges of high voltage. One of the lead-in wires is enclosed in a special glass sleeve. The other lead-in wire is wrapped around this sleeve. At the end of the lamp life, an internal arc will melt the sleeve and allow the lead-in wires to fuse and complete the circuit. The new lamp is adaptable to present series circuit systems.

General Electric Company, Nela Park, Cleveland, Ohio

Luminous Ceiling

(56)

A new concept in luminous ceilings, the Infinilite floating luminous panel, is specifically designed to lower ceiling heights in remodeling and relighting of older offices, apartments, professional suites, hotel baths and similar rooms. The baked white enamel aluminum finish trim is used with Infinilite non-modular suspended ceiling panels which interlock to form a continuous uniform ceiling area.

Integrated Ceilings Corp., 9011 Beverly Blvd., Los Angeles 48, Calif.

Product Briefs

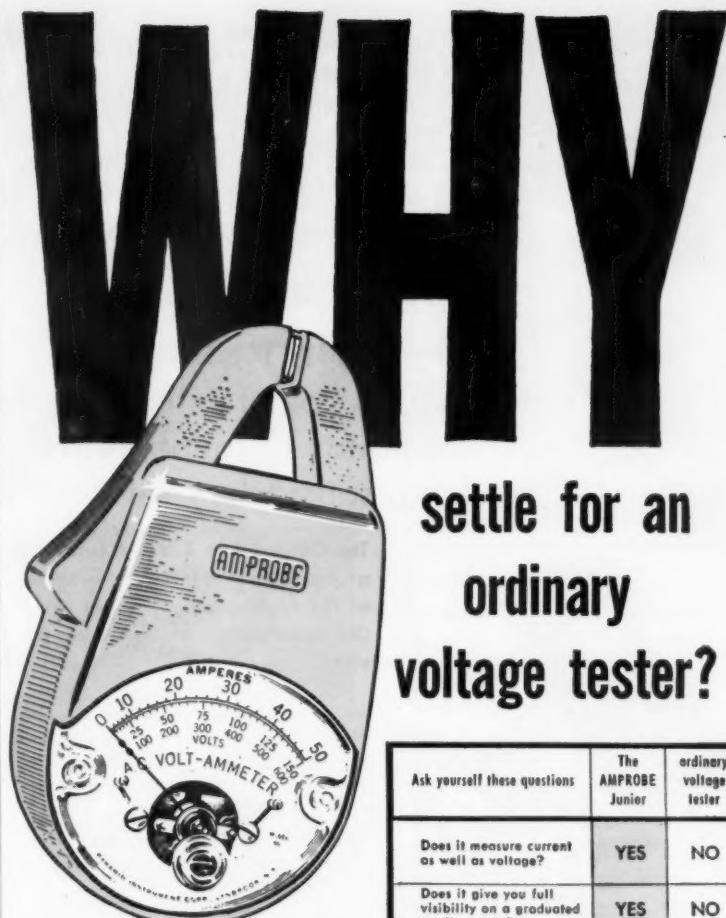
(57) A fiber glass plastic job shack, called Kemhut, is 10 ft wide, 12 ft long, 7 ft high and is manufactured by Kemlite Corporation, Joliet, Ill. . . . (58) A complete line of asbestos fixture wire has been introduced by the Carol Cable Company, Pawtucket, R. I. . . . (59) A 45-lb portable, high-powered public address system designed for use in civil defense, military installations and industry for distances up to three-quarters of a mile has been introduced by the David Bogen Company, a Division of the Siegler Corp., Paramus, N. J.

(60) A 3-station portable visual and audio signal system, called the "View Talk" has been developed by the Mark Simpson Manufacturing Co., Inc., 32-28 49th St., Long Island City 3, N. Y.

(61) H. S. Watson Company, Emeryville, Calif., now offers a complete line of new "Weight-lifter" elevating tailgates for pickups, on through $\frac{3}{4}$ to 2-ton trucks with stake or van bodies. . . . (62) A transistorized photoelectric relay, called the "Transeye", developed for heavy-duty industrial service is now available from General Electric Co. Specialty Control Department, Schenectady, N. Y. . . . (63) Norseman Marine, Oshkosh, Wis., has announced a new diesel powered light plant with a capacity of 25,000 watts.

(64) Midwest Electric Products, Inc., Mankato, Minn., has introduced a new line of ring-type current transformers, especially useful on small switchboards and portable ac ammeters. . . . (65) A new proximity limit switch, type 2782, has been announced by ATC, Inc., King of Prussia, Pa. . . . (66) The new Target "368" self-propelled concrete saw has been announced by Robert G. Evans Co., Kansas City, Mo.

(67) A dry-cell battery reactivator which is capable of reactivating up to 96 standard type "D" flashlight batteries has been developed by Semco Research, Inc., Inglewood, Calif. . . . (68) Buchanan Electrical Products Corp., Hillside, N. J., has announced the addition of new cable staples to its line of electrical contractor supplies. . . . (69) A new pressure-relief device that is automatic and maintenance-free has been developed by Pennsylvania Transformer Div., McGraw-Edison Co., Canonsburg, Pa.



**settle for an
ordinary
voltage tester?**

Ask yourself these questions	The AMPROBE Junior	ordinary voltage tester
Does it measure current as well as voltage?	YES	NO
Does it give you full visibility on a graduated reading scale?	YES	NO
Does it fit conveniently in your pocket?	YES	YES
Does it measure within $\pm 3\%$ accuracy?	YES	NO
Does it come in a full line of models to meet different problems?	YES	NO
Does it protect you against shorts and shocks?	YES	YES
Does it balance loads, locate grounds, determine motor overloads, check rating of circuit breakers?	YES	NO

The AMPROBE Jr. gives you so much more...not just a run-of-the-mill voltage tester but a precision-made instrument that measures voltage and current instantly and accurately without shutting down equipment. All this with one rugged and inexpensive pocket-size tool! And now...FOR THE FIRST TIME...at the request of utilities, industrial plants and other large-scale users of AMPROBES, the AMPROBE Jr. has gone SAFETY YELLOW to conform with standard safety practices.

ALL THIS AND A GENEROUS TRADE-IN PROGRAM TOO...

that's right, you can get all this and an extra \$2.00 dividend for your old voltage tester...regardless of what it is or what condition it's in.

Yes your authorized AMPROBE distributor is prepared to credit you with \$2.00 towards the purchase of a new SAFETY-YELLOW AMPROBE Jr. for your old voltage tester. So don't delay...stop in at your nearest AMPROBE distributor for the best buy in '58.

Amprobe Jr.

snap-around volt-amp tester

\$19.85

PYRAMID INSTRUMENT CORP., Lynbrook, New York



**This symbol on
Specification Grade
G-E Wiring Devices
assures you of extra features
for handy installation and
long, satisfactory service**

**The GE4065 ASA & NEMA standard
grounding outlet is a good example
of the high quality you get in all
G-E specification grade wiring devices**

Has convenient grounding terminals on each side, to permit easy carry-through of grounding wire. Mounting strap connected to grounding terminal for automatic grounding on conduit or armored cable circuits.

Through strap, with heavy molded base and face assembled to it, won't bend out of position in mounting.

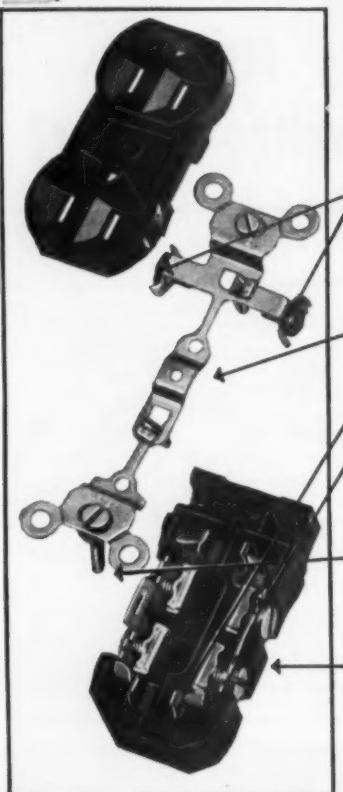
Double-wipe contacts.

Break-off can be removed with screwdriver, permitting outlet to be wired as: (1) Common feed, common ground (2) Separate feed, common ground, or (3) Separate feed, separate ground.

Plaster-cleaning mounting screws thread easily into clean or plaster-clogged box ears, and are extra-long (7/8") to simplify mounting when box is set deep. Plated screws are held in strap by fiber washers . . . all ready for mounting.

Back-wiring pressure terminals wire easily with Nos. 14, 12 or 10 Awg wire.

ASA & NEMA standard, 125V-15A rating. Also available (GE4067) with 250V-15A rating. Ivory, and brown. Listed by U.L., meets Federal, ASA and REA specifications.



General Electric Specification Grade Wiring Devices contribute to the best reputation of the man who recommends or uses them. Choose from the high-quality G-E line for easier, more profitable, more dependable wiring installations. General Electric Company, Wiring Device Department, Providence 7, Rhode Island.

Progress Is Our Most Important Product
GENERAL ELECTRIC

Catalogs & Bulletins

(70) FLOODLIGHTS and Condulets used in the missile industry. Bulletin 2707, 8 pages, describes special equipment developed for launching sites and test areas. Crouse-Hinds Co.

(71) SHADED POLE MOTORS. Catalog U-1 presents general information including charts, diagrams, and data on braking and controls. Barber-Colman Co.

(72) LIGHTING FIXTURES. 32-page priced catalog covers line of commercial units, recessed troffers, strips, industrial reflectors, bullets and residential fixtures. Luminous Ceilings, Inc.

(73) UNDERFLOOR DUCT. 6-page folder describes office building using precast concrete hollow floor cells to provide raceways for three complete underfloor electrical distribution systems. Flexicore Co., Inc.

(74) AC MOTOR DRIVES. Bulletin D-2506, 16 pages, describes V-S drives for precise, adjustable machine speeds from in-plant ac circuits, including specifications, dimensions and accessories. Reliance Electric and Engineering Co.

(75) CLOSED CIRCUIT TELEVISION. 12-page Bulletin 2239 covers major types of industrial television equipment, giving basic suggestions for equipment selection with illustrations of case histories. Diamond Power Specialty Corp.

(76) BREATHERS AND DRAINS for Condulets, Type ECD. Bulletin 2702 describes importance of moisture removal to life of explosion-proof equipment. Crouse-Hinds Co.

(77) DISTRIBUTION CLAMPS for aluminum-to-copper and aluminum-to-aluminum conductors in sizes from No. 6 to 1/0, No. 2 to 4/0, and 1/0 to 336.4. 4-page supplement No. P158. Reliable Electric Co.

(78) CENTRIFUGAL SWITCH for capacitor and split-phase motors for speeds of 900, 1200, 1500, 1800, 3000 and 3600 rpm is described in 2-page bulletin. Kirkwood Communicator Corp.

(79) MOTOR-GENERATOR SET for converting 60-cycle input to 400-cycle output at 1200 rpm is detailed with specifications and dimensions in 2-page bulletin MG-658. Kato Engineering Co.

(80) UNIT SUBSTATION TRANSFORMERS. 12-page bulletin gives

ratings and construction details of complete line, oil or askarel immersed, ventilated or sealed dry type. I-T-E Circuit Breaker Co.

(81) CONDUIT AND EMT BENDER. Bulletin gives data on new shoes for bending conduit and EMT to various radii, available for $\frac{1}{4}$, $\frac{3}{8}$, and 1-in. diameters. Chamor Mfg. Corp.

(82) POWER CAPACITORS for high-voltage applications in ratings of 50 and 25 kvar are described in 8-page bulletin GEA-6662A. General Electric Co.

(83) VAPORTIGHT LIGHTING of anodized cast aluminum. Wall and ceiling fixtures plus junction boxes and finishing collars are covered by 4-page folio 58-7. McPhilben Lighting, Inc.

(84) WIRING DEVICES, lamps and specialty products—76-page catalog illustrating over 1500 items. Eagle Electric Mfg. Co. Inc.

(85) CABLE RACKS AND TROUGHS of aluminum for interlocked armor cable. 8-page bulletin pictures all sections and fittings, with dimensions. Washington Aluminum Co., Inc.

(86) PROTECTIVE GAPS for positive protection of series capacitors, designed to improve secondary voltages, eliminate flicker, and make distribution transformers self-regulating. Bulletin GEA-6855, 4 pages. General Electric Co.

(87) MAINTENANCE TOWER for all types of overhead work. 4-page bulletin 18, Section A, describes and illustrates Moto-Lift tower with working height of 6-ft 8-in. to 17 ft. Safway Steel Products, Inc.

(88) QUARTZ LAMPHOLDERS of aluminum-ceramic construction for quartz lamps rated from 500 to 5000 watts are completely detailed in 4-page bulletin. Miskella Infra-Red Co.

(89) AUTOMATIC CONTROLS Catalog 26, 52 pages, covers electric thermostats, pressure controls, humidistats, and motor-operated valves. Barber-Colman Co.

(90) CAPACITORS—how they provide savings on urban distribution systems. Bulletin GEA-6715, 14 pages, gives cost-reduction analyses through addition of capacitors for improving power factor and reducing flow of kilovars on primary feeders. General Electric Co.

(91) UNDERGROUND CONNECTORS and fittings for use with underground distribution networks and industrial applications. Dossert Mfg. Corp.

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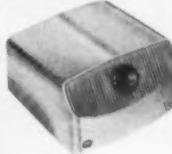
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(92) GENERATOR CONTROL. Bulletin 8.010 gives circuit schematics, principles of operation, performance results, specifications, and installation data on new dual-mode excitation system for ac generator control. Electric Regulator Corp.

(93) ANNUNCIATORS for continuous process industries. Bulletin 103 describes annunciator featuring flashing sequence alarm and no-drain circuit for monitoring complex automatic equipment. Panellit, Inc.

(94) LIGHTNING ARRESTERS for distribution service. Publication 1402-H, 6 pages, gives construction details, protective characteristics, ratings and dimensions of line of Dynagap Thorex protectors. Ohio Brass Co.

(95) WIRE AND CABLE of silicone rubber. 8-page bulletin gives details on power cables, control cables, motor lead wire, heating cable, defroster wire, and appliance and fixture wire. Rockbestos Products Corp.

(96) MOTOR CONTROL CENTERS for industrial applications. Bulletin GEA-4979D, 12 pages, describes NEMA sizes 1 through 6 for use where two or more ac and/or dc motors can be controlled from one location. General Electric Co.

(97) BLOWERS. New 16-page Bulletin 5412 describes new line of special purpose air moving units including packaged centrifugal blowers, vane-axial fans, tubeaxial fans, and pressure blowers. American Standard, American Blower Div.

(98) HIGHWAY HAZARD LIGHTING, including transistorized highway warning flashers and electric lanterns, is described in new catalog giving detailed product specs, dimensions, burning time and candlepower. R. E. Dietz Co.

(99) DUCT SYSTEMS for installing surface-mounted communication and power wiring in two parallel runs of raceway are described in 4-page booklet. Wiremold Co.

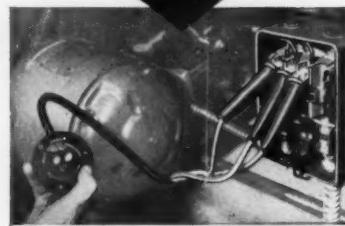
(100) ELECTRIC HEATING DEVICES. 52-page booklet, GEC-10051, supplies answers for hundreds of heating problems on pipe heaters, immersion heaters, replacement elements, and others. General Electric Co.

(101) MERCURY FLOODLIGHTS. Bulletin GEC-1486, 8 pages, describes line of floods for parking lots, shopping centers, service stations, railway yards outdoor work areas, loading docks, and similar areas. General Electric Co.



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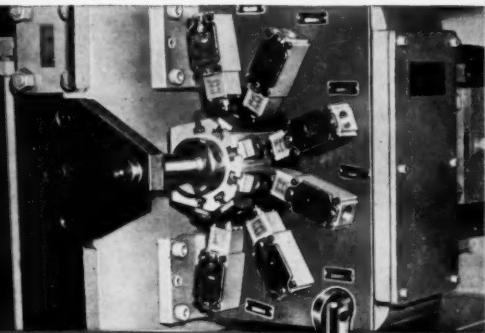


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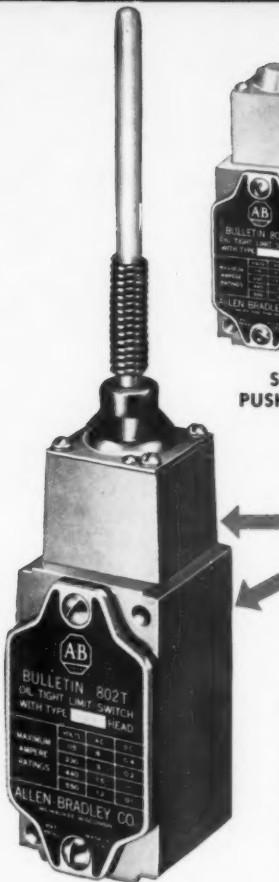
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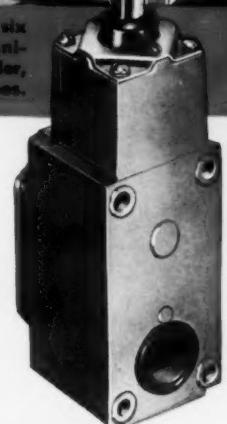
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Push roller, oiltight limit switch, showing rubber grommeted wiring hole on back of "manifold" type, used on above automatic production machine made by Cross Company, Detroit.



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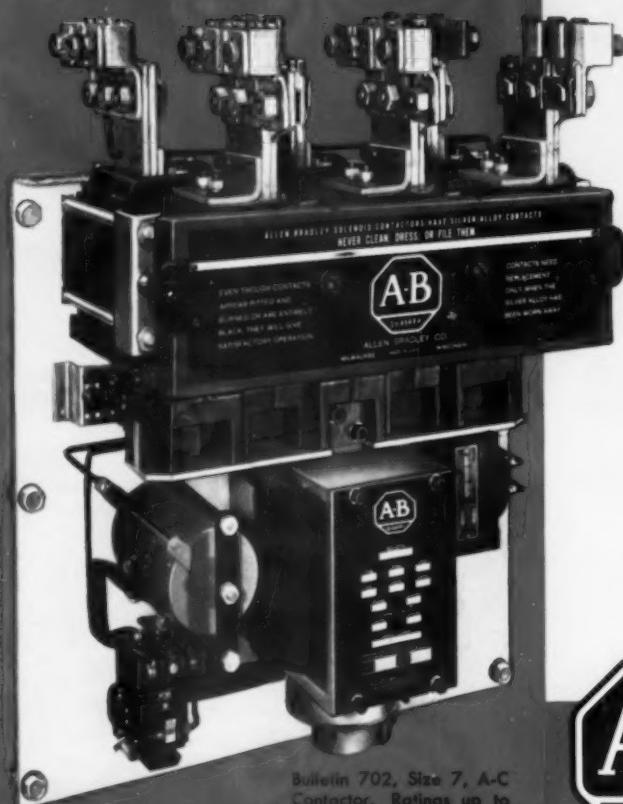
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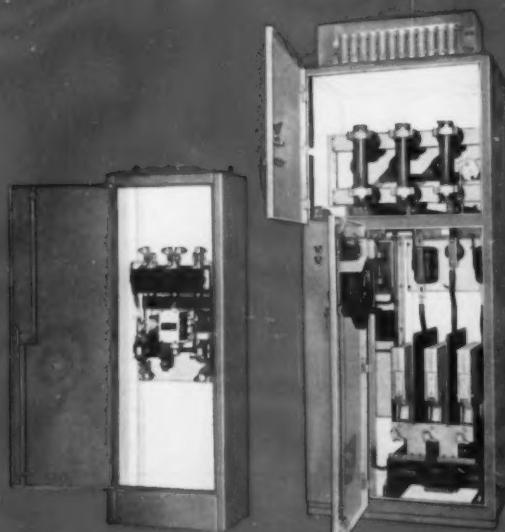
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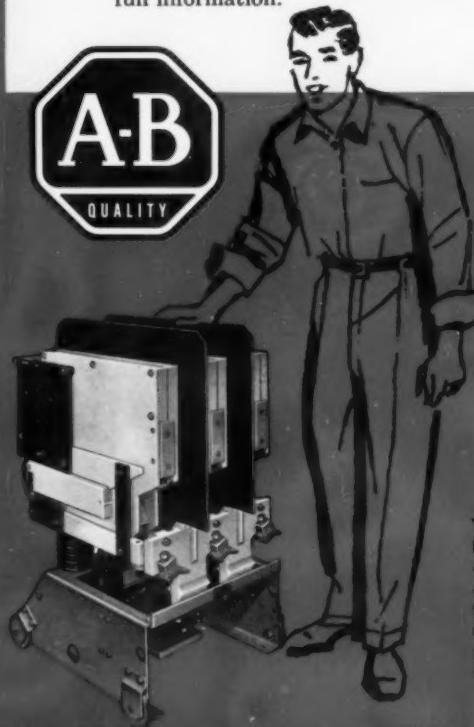


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Reader's Quiz

QUESTIONS from readers on problems of industrial equipment, installation, maintenance and repairs. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published we pay \$5.00.

Recharging Batteries

QUESTION S34—In the mill where I am employed one of my responsibilities is to keep all hand lanterns and flashlights in good working condition. The greatest difficulty is to try and make ends meet on a limited budget because the cost of flashlights and other dry batteries is too high. Can someone tell me of a good rechargeable battery that is small enough to be practical for flashlights and hand lanterns? I saw an article in a leading magazine that stated it was possible to recharge a standard dry type battery. Is this practical?—M.D.

ANSWER TO S34—We have had a great deal of experience with hand lantern and flashlight problems in attempting to cut the cost of replacing batteries of the dry type.

If "M.D." will consult the catalogues of the various battery manufacturers he will find a list from which to select just what is needed, both in dimension and wattage. Conversion from dry to wet cell for the lanterns is a practical idea if sufficient care is exercised in the selection of the battery, the charger and the use of the lantern. Electrolyte spillage is a factor to consider.

Various chemicals have appeared on the market from time to time to rejuvenate dry cells. None, however, in our experience warranted adoption as a permanent device for the flashlights used. These are still powered with dry cells.

For elevator emergency lights, as well as the corridors not near outside windows, we use a wet cell storage battery with trickle charger and relay combination. In the event of power outage the battery takes over where the ac failed. State law requires their use in Massachusetts I believe.—P.C.Z.

ANSWER TO S34—There are rechargeable batteries available for the service mentioned by Mr. M. D., but their cost is much greater than regular dry cell batteries and the economics involved must be properly evaluated taking into account the investment in charging equipment, handling of batteries for charging, and replacement of bat-

teries due to damage or pilferage—before a decision is made to justify their use over regular batteries.

Experience has shown that in the majority of cases the use of longer lived batteries, of which many are available, is the answer to reducing battery replacement costs. Longer lived batteries are available from any of the leading battery manufacturers.

Recently a new alkaline long-life battery for flashlights has been announced, which lasts ten times as long as ordinary dry cells. It also delivers more power. Information on this new product can be obtained from the Simplex Wire & Cable Co.

It is my suggestion that you investigate the availability of longer-life batteries for your application before considering rechargeable ones.—R.E.B.

The motor can be rewound for the higher voltage and the horsepower will be the same.

As to the question whether a rewind will cost more than a set of transformers, there are too many other local factors to be considered for a definite answer. If 4160 is used, the cost of buying and installing new controls will have to be included, so this question is a local matter.—J.A.

ANSWER TO T34—A 250 hp motor connected directly to 4160 volts will save the power lost in the line and transformer. From the other side, 220 volts coming from a transformer near the load, and yet out of reach of the untrained help can give your plant a better safety record and lower insurance rates.—H.S.

Squirrel Cage Induction Motor

QUESTION T34—Is it possible to rewind a 250-hp, 220-volt, 3-phase, 60-cycle squirrel cage induction motor for 4160-volts? If so, what will the new horsepower rating be?

What determines if a 220-volt motor can be rewound for 4160?

Finally, is it more economical to rewind the above motor to release 250 kva of secondary power than it is to purchase 250-kva transformers for 4160/220 volts?—J.A.M.

ANSWER TO T34—Since voltage is not determined by horsepower, it is assumed the writer of the question means re-connect instead of rewind. Any motor regardless of horsepower, can be rewound for any voltage. A change of voltage will not affect the horsepower.

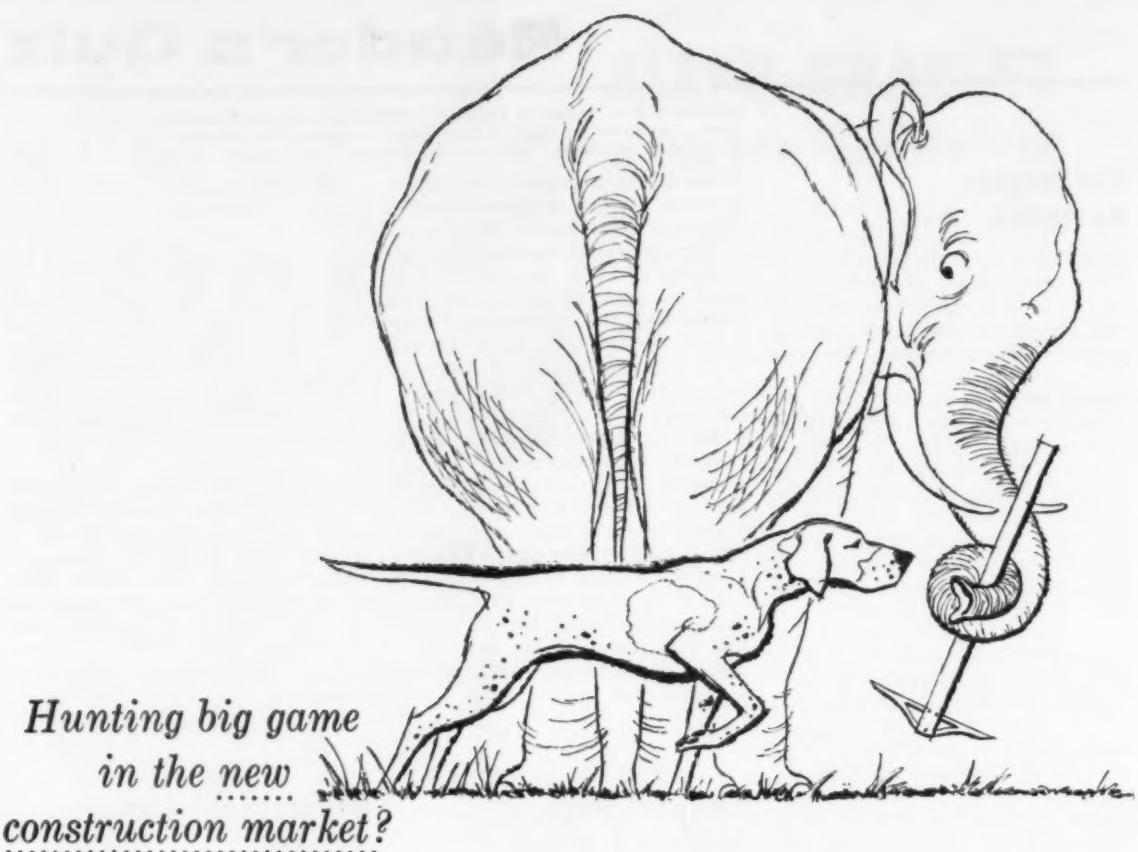
The nature of the winding in question determines whether it can be re-connected for higher voltage.

Operating voltage of a winding is determined by number of turns in series per circuit. In a change from 220 volts to 4160 volts, approximately 20 times as many turns will be required for the new winding. It is seldom possible to accomplish this by re-connecting. Also it is seldom that 220-volt insulation will be suitable for 2140 volts.

Fluorescent Lamp Flicker

QUESTION U34—Could someone explain the reason for the very noticeable flicker in many of the fluorescent lamps in a relatively new installation? I have been told that this is not "flicker" but rather a "swirl". Is there any way of correcting it?—I.G.B.

ANSWER TO U34—The "flicker", "swirl" or "snake" is characteristic of many but not all new fluorescent lamps and is directly associated with the "aging in" process of the lamps. One theory as to the cause of the "snaking" has to do with the coating found on the cathode of all fluorescent lamps. New lamps have a metallic oxide coating deposited on the cathode during manufacture to promote the emission of electrons when the lamp is in operation. The metallic oxide, as an oxide, allows the arc stream to migrate from one area to another producing the snaking effect. The bombardment of the metallic oxide by electrons and ions in the arc stream causes the oxide to break down into its basic components (a pure metal and oxygen). The resulting pure metal is eventually deposited in a molecular thin coating over the entire surface of the cathode. When the cathode is



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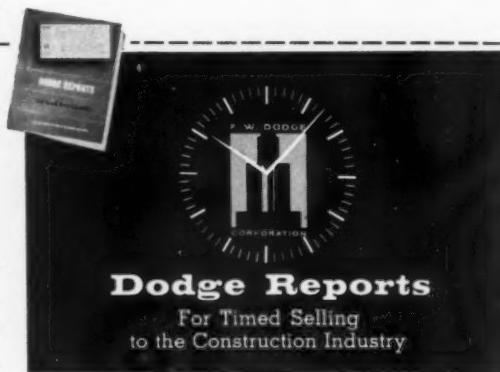
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completely coated with this pure metal, the lamp is said to be "aged in" and will no longer "snake".

The best way to correct this condition is to allow the lamps to "age in" by operating them continuously for about 24 hours.—E.A.R.

ANSWER TO U34—Some fluorescent lamps exhibit what is called a "swirl" or a bright spiral that moves within the lamp cylinder. Normally this effect is only found in new lamps and it generally disappears after a short period of burning. Sometimes it will disappear if the lamp is shut off and then restarted. The condition may be intensified by inadequate preheating time or low initial lamp temperature. Swirling is also more common in instant-start than in preheat circuits.—L.D.B.

Can You Answer These QUESTIONS?

QUESTION B35—Can a combination voltmeter and ammeter which uses one meter for all readings be used as a wattmeter by connecting voltmeter and ammeter connections at the same time in the circuit? The voltage would have a one-to-one isolating and insulating transformer between the voltage and meter. The current and voltage ratings would also be each reduced to half normal so as not to overload the meter. Only approximate readings are required.—E.B.

QUESTION C35—What is the significance of polarity of transformer windings; i.e., subtractive or additive, and why are not all transformers wound additive?—J.A.M.

QUESTION D35—In our public utility system we have several 3-phase power banks connected closed delta and open delta. Secondary voltage is 240 volts. Many of these banks never had secondary grounds at the pole or at the service entrance switch. We are considering grounding these banks at the pole. The service entrance switches which have been in for many years are 3-pole fused type with no ground. After eliminating all accidental grounds, we are considering adding a ground at the service switch and making the grounded or common line fuse solid.

What are your recommendations for a new grounded service?—D.J.D.

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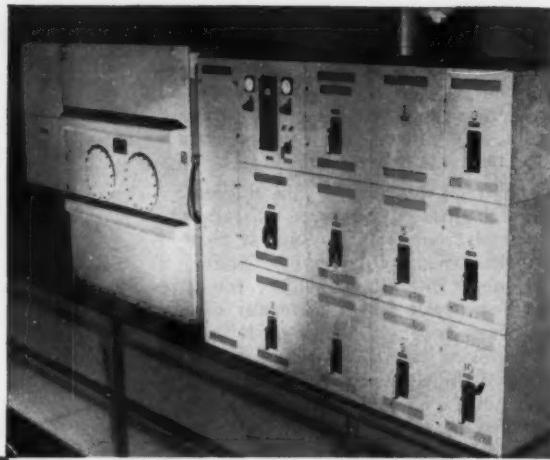




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WT58-9

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

Questions on the Code

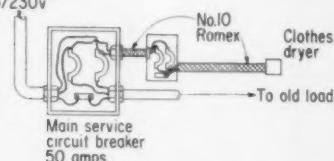
Answered by:

B. A. McDONALD, New York Board of Fire Underwriters, Rochester, N. Y.
B. Z. SEGALL, Consulting Electrical Engineer, New Orleans, La.

Wiring Clothes Dryer

Q. We find in wiring electric clothes dryers that it is the practice of some contractors to come from the line terminals of the old multibreaker (MO type or equivalent) with the No. 10 Romex to a 2-pole circuit breaker. You can see that the No. 10 wire is coming from an already loaded terminal, usually fed with No. 6 entrance cable. We have felt this to be a violation of the code. We will appreciate your answer to this.—W.E.P.

Service No 6
115/230v



A. For the benefit of our readers, I have shown by the illustration the wiring procedure outlined as I understand it. If my concept of the problem is correct we have, as an example, a No. 6 3-wire 115/230-volt set of service entrance conductors which terminates in a 50-amp main service circuit-breaker. This assembly constitutes the service as originally installed. The customer purchases a clothes dryer, and the electrician connects No. 10 Romex (non-metallic sheathed cable) to the line terminals of the 50-amp service circuit-breaker for the purpose of serving an additional service circuit-breaker or switch, which in turn serves as the branch-circuit protective device of the circuit feeding the dryer.

In addition to the probable overloading of the service entrance conductors, there appears to be other code violations listed as follows:

1—According to the provisions of Section 3737-b, switch enclosures shall not be used as junction boxes, troughs or raceways for conductors feeding through or tapping off to other switches, unless special designs are employed to provide adequate space for this purpose.

2—Since the No. 10 non-metallic sheathed cable running from the original main service circuit-breaker to the new service circuit-

breaker are considered to be service entrance conductors, they must satisfy the provisions of Section 2331, which you will note does not recognize non-metallic sheathed cable for this purpose.

3—There could be a question with respect to connecting more than one conductor to the terminals of the 50-amp circuit-breaker. Section 1113 requires terminals for more than one conductor to be of a type approved for the purpose.

In addition to the foregoing the fine print note following Section 2304 recommends a minimum 100-amp 3-wire service for all individual residences.

In view of the foregoing there appears to be several code violations with respect to the procedure described, and perhaps the most important is the probability of overloading the service conductors. During the past few years the question of adequate wiring has been brought to the attention of the public by all known means of communication. We, who serve the public with their electrical needs, should be the last to discount its importance.—B.A.McD.—10/58/1

Supports—NM and NMC Cable

Q. We would appreciate your interpretation of the following question which has arisen in this area on Article 3363 of the 1956 Code. Contractors general practice on installing NM cable in new frame construction is not to staple wires in wall sections which will later be sealed in. Code states staples should be placed. Contractors believe staples should not be placed in wall sections as without staples they are able to pull in heavier, additional wires at a later date for air conditioning or heating. Will you please give us your views on this subject.—F. McD.

A. The provisions of Section 3363 of the N. E. Code definitely require that non-metallic sheathed cable be supported at intervals not exceeding 4½ ft and within 12 ins. from every outlet box or fitting. This provision applies to exposed work, and work in any new

building under construction which will eventually be concealed. The only exceptions concern the wiring of an old building, where the cable is fished from outlet to outlet and it is impracticable to obtain such supports. The same exception applies to the finished panel of prefabricated buildings. It appears obvious to me that such supports are essential in a new building under construction in view of the mechanical injury involved during the construction period. The carpenter and plumber usually are not concerned with the work of the electrician, and cables dangling in wall and ceiling structures would be unduly exposed to mechanical injury from such artisans. It would be easy to pull a cable out of a box connector when such cables are not supported within 12 ins. of the box. Such conditions, unless corrected before the wiring was concealed, promotes a serious fire hazard. As a result of the foregoing, it is a definite violation of the code to eliminate the cable supports as outlined in your question. Since it is desirable to provide for future loads, such as air conditioning and heating, it appears to me that a desirable method of procedure would involve the installation of spare circuits at the time of the original installation. The only other alternative is to install a raceway system of wiring.—B.A.McD.—10/58/2

Interrupting Capacity

Q. To what extent does the code cover requirements for interrupting capacity requirements?

Do you know of a simple method recognized by code Authorities for determining short circuit requirements and the selection of equipment to be used?

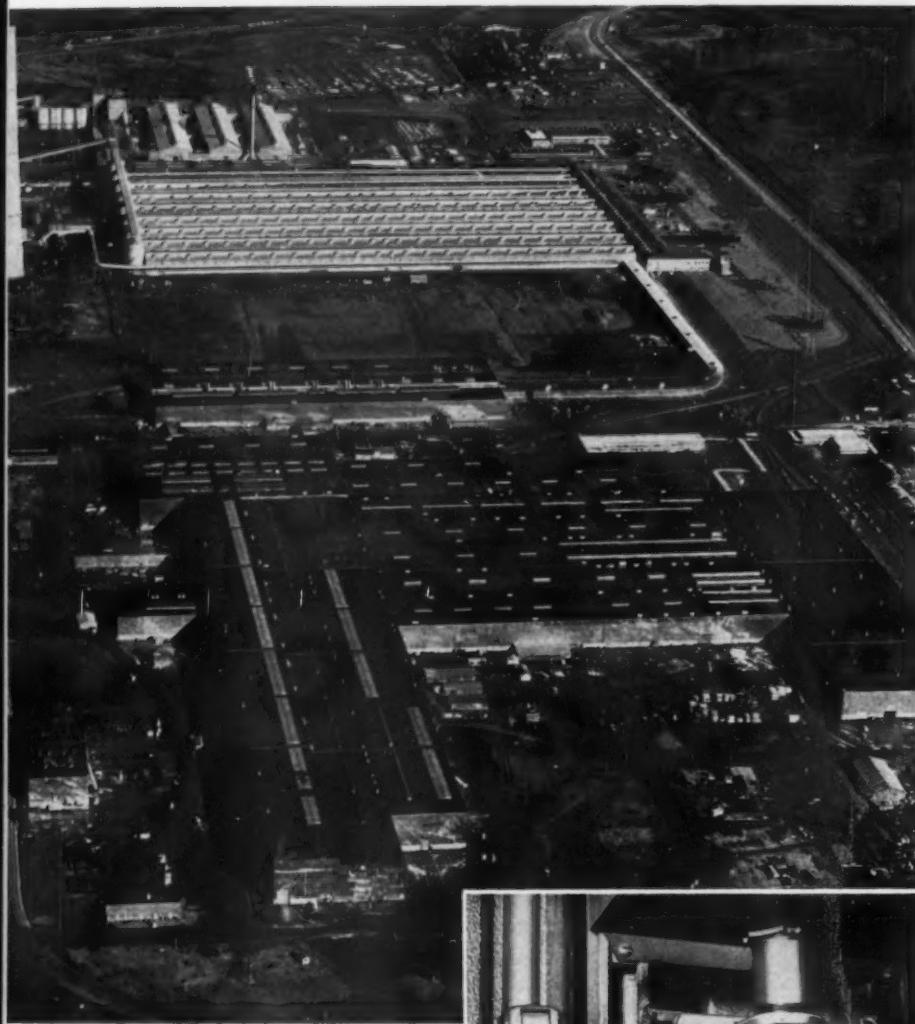
Does UL anticipate higher ratings on equipment to coincide with NEMA ratings?—H.D.M.

A. The index to the code refers to Section 1115, as covering interrupting capacity, in general. This is an error which is being corrected.

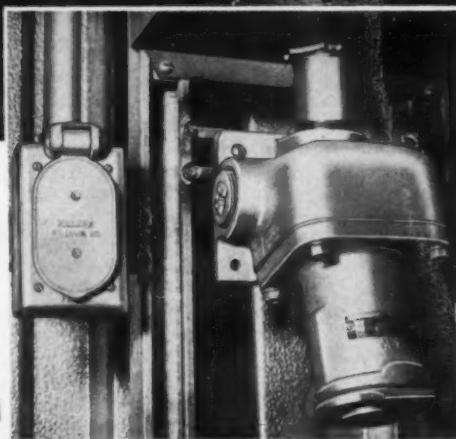
The correct section is 1109 of Article 110.

In addition there is another

Kaiser Aluminum uses



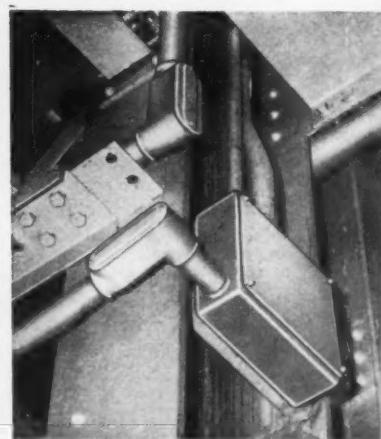
The new Ravenswood Works of the Kaiser Aluminum & Chemical Corp. offers 32 acres of fabricating facilities (foreground plant) plus reduction and casting plants. Safe, non-rusting, non-corroding explosion-proof Killark fittings and fixtures were among those used in the installation of electrical systems throughout the Works.



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It is a significant fact that a company as well versed in the chemical and physical characteristics of aluminum as is the well-known Kaiser Aluminum & Chemical Corporation should specify aluminum for many of the electrical installations in their new plant at Ravenswood, W. Va.

Alumalloy, Killark's exclusive aluminum alloy, has been skillfully incorporated into fittings and fixtures that offer strength on the job, durable rust and corrosion resistance, spark-free safety and an overall appearance that is functionally attractive.



A worm's-eye view of more on-the-job protection: includes two Alumalloy conduit fittings and an extra-deep two-gang switch box.



Killark

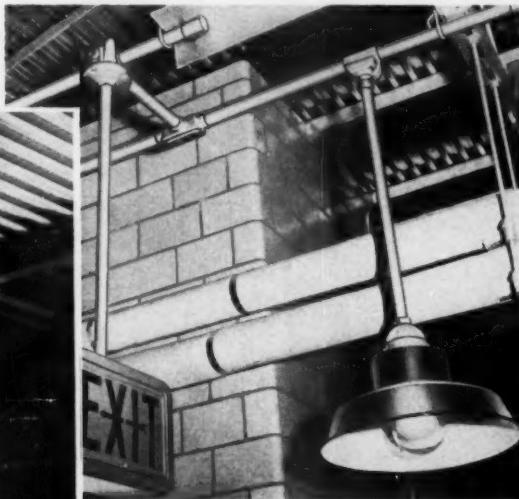
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KILLARK Aluminum Electrical Fittings for New Plant Installation

Kaiser Aluminum's New Ravenswood Plant Utilizes Aluminum Fittings & Fixtures Throughout for Safety . . . Strength . . . Protection from Rust and Corrosion . . . Attractive Design



Overhead lighting fixtures are suspended, as shown here, from Killark vapor-tight junction boxes.

A junction box and 3-hub conduit body complete this overhead installation.



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BOSTON—Electrical Agencies, Inc., 49-51 "D" St.,
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CHICAGO—Jack L. Rowe & Son, 2039 W. Jackson,
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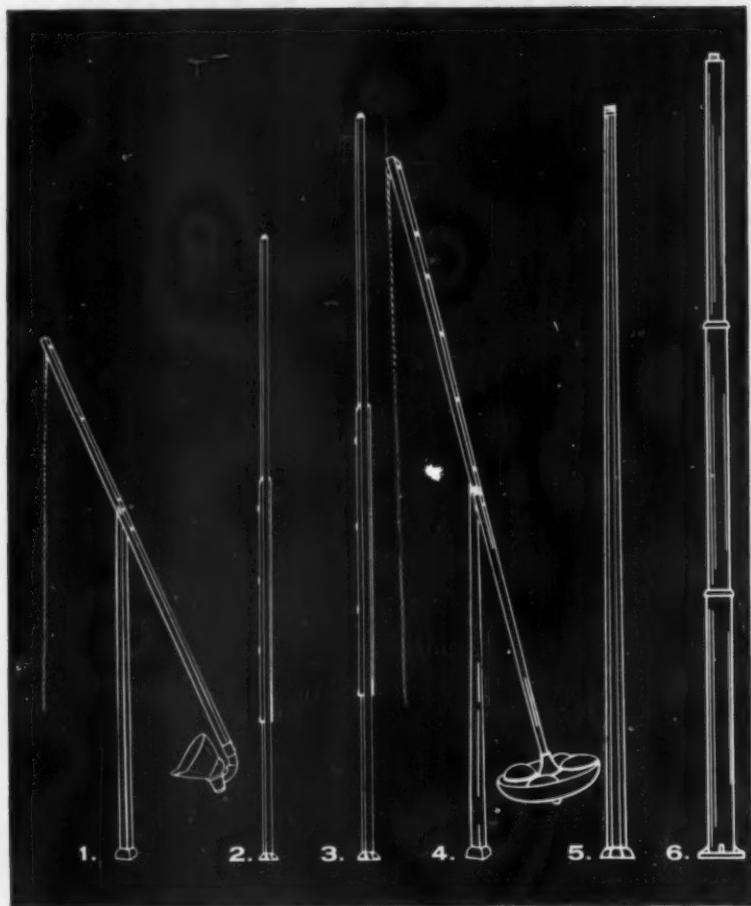
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Revere Poles for Floodlighting

1. Square hinged poles (199-G Series) in 18, 20 and 24-foot mounting heights for 1 or 2 general purpose floodlights. Made of seamless steel tubing, with 2½-inch upper section, 3-inch lower section. Pole tops have 2-inch threaded nipples for brackets.

2. Heavy duty square tapered hinged poles (199-E Series) in 20 and 24-foot mounting heights, for 1, 2 or 3 floodlights. Tapers from 2½ inches to 4¼ inches. Base has 8-inch bolt circle. Pole tops have 2-inch threaded nipple for floodlight mounting brackets.

3. Heavy duty square tapered hinged poles (199-D Series) in 30-foot mounting height for 1, 2 or 3 floodlights. Tapers from 2½ inches to 5½ inches. Base is made of cast steel, welded in position, and has 11-inch bolt circle. Pole tops have 2-inch threaded nipple.

4. Extra heavy duty hinged poles (No. 199-DB Series) in 30-foot mounting height, for the Ultra-Lite Luminaire or floodlights up to 180 lbs. Tapers from 3 inches to 5½ inches, has 11-inch bolt circle. Pole tops have 10-inch long (3-inch dia.) threaded pipe stub.

5. Octagonal tapered rigid poles (560 Series) in 20, 25 and 30-foot mounting heights for 1 to 5 mercury or incandescent floodlights. Made of 11-gauge Cor-Ten steel. Tapers from 3¾ inches to 7 inches. Pole tops furnished with 2 or 3-inch threaded nipple.

6. Rigid poles (115 Series) in 20 to 60-foot mounting heights, for up to 10 floodlights. Made of standard steel pipe in separable lengths of 22 feet or less. Pole tops have 3-inch threaded pipe stub. Poles available for base and bolt mounting or concrete mounting.

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reference to interrupting capacity in Article 230—Services. This applies specifically to the use of circuit breakers and fuses as overcurrent devices for services exceeding 600 volts—See Section 2389 paragraphs c and d.

The general rule of Section 1109 would apply to all electrical construction. So while Section 2389, paragraphs c and d, specifically refer to one phase of electrical construction, the generality of Section 1109 would indicate the general requirement for such construction in all electrical equipment.

In answer to your second question I may simply state "There is no royal road to knowledge." There have been developed many short cuts, formulas, etc., to expedite "short circuit" calculations. However, to properly apply and use these, one must first have a rather thorough knowledge of the basic principles and theory used to develop these simple aids.

All the manufacturers of switchgear equipment have developed short cut tables, curves, etc., to help determine the required interrupting capacity for equipment and systems. Many textbooks and handbooks are available. The old National Electric Light Association (NELA) Relay Handbook covered the theoretical considerations quite thoroughly. The Westinghouse Electric Corporation's handbook "Transmission and Distribution", Beeman's "Industrial Power Systems Handbook" (Published by McGraw-Hill Book Co.) and the McGraw-Hill "Standard Handbook for Electrical Engineers", to mention but a few, are available for such basic material covering interrupting capacity theory.

In many cases a preliminary discussion with the utility company engineers will determine the maximum available short circuit current at the point of service. This is quite often the main determining factor and can be used for designing all the equipment connected beyond this service point.

The type of connected load is also very important. Motors, etc., under short circuit conditions will also contribute to the overall short circuit current available at any one point in a system.

The problem may be quite simple and then again most complex, depending entirely upon the particular system involved. As an illustration of a possible simple system the diagram shows a 100-kva transformer feeding a single customer



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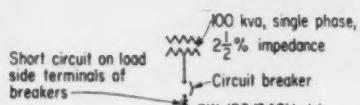


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for a 120/240-volt, 3-wire, single phase service.

For simplicity we will assume the utility system can supply unlimited short circuit current and we will neglect all limiting factors such as line and load impedances and circuit breaker impedances.

The full load secondary current would be

$$\frac{100 \times 1000}{240} \text{ of } 417 \text{ amps}$$

The maximum available short circuit current based on the transformer impedance only, would be

$$\frac{100\%}{\% \text{ transformer impedance}} \times \text{transformer full load current or } \frac{100}{2.5} \times 417 \text{ or } 16,680 \text{ amps}$$

As indicated, the capability of the utility system to supply this current, the impedance of the line leads, the load leads, the circuit breaker contacts, no matter how slight, will all tend to limit the actual current to some value below this optimum value.

However, the load itself will tend to build up the short circuit current in some cases. Thus motors and generators on the load side contribute short circuit current to the fault. In some cases this current is small compared to the short circuit current contributed by the system. It must nevertheless be determined to obtain a true picture of the interrupting capacity required for the system equipment.

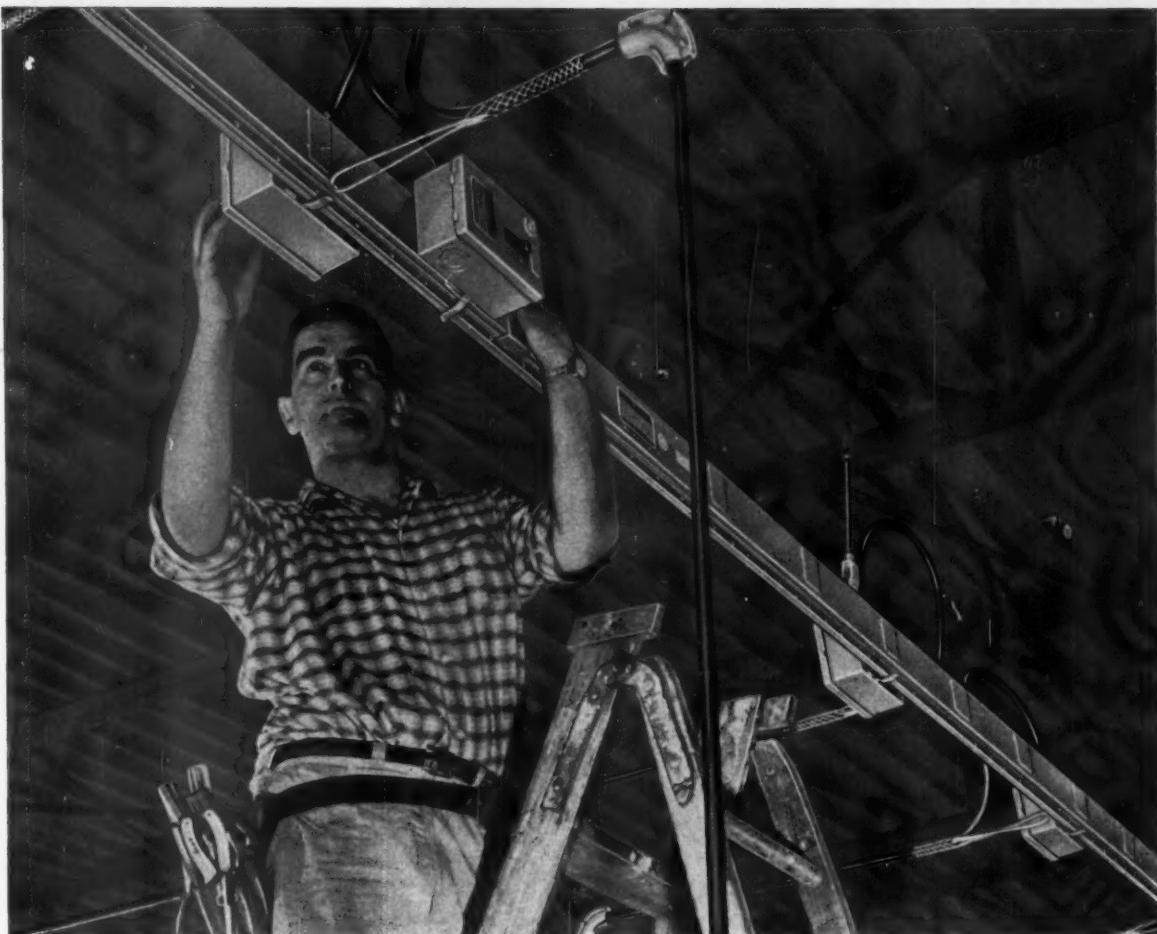
As to the third question, this can only be answered by the UL itself. It is true that at present the UL ratings are in many cases below the ratings based on NEMA testing procedures. For example, a Square D Co Type ML breaker for 240-volt, ac service will have a 5000-amp UL rating, but will show a 7500-amp capability on the basis of NEMA test procedure.

There are many factors involved in this test procedure and it can be assumed that UL will develop testing procedures commensurate with the overall demands made by its clients.—B.Z.S.—10/58/3

Motor Branch Circuit Protection

Q. In example No. 8, Chapter 10, the fuse ratings for motor branch circuit overcurrent

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saves 25% in wiring cost, hailed
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G-E distributors, nationwide, stock Type DH, including its wide variety of fittings and accessories. So DH busway matches wire and conduit in availability as well as cost. Ask your General Electric distributor or representative for Bulletin GEA-6172. Or write directly to **Distribution Assemblies Department, General Electric Company, Plainville, Connecticut.**



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LIGHT
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SEEING
AND
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Footcandle measurements of both the old and the I-L-C Quad installation prove that I-L-C with the super-powered P G fluorescent lamps produce more light (actually 60 to 75 fc at working levels) with fewer lamps, less equipment and at lower operating cost. The improvement in appearance is obvious—replacing the old fashioned bare lamp fixture with the trim, "tailored" I-L-C. The Schlafer-Ace store manager reports that I-L-C lighting has permitted a reduction in sales force due to an overall increase in store efficiency.

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protection obtained from Table 20 are in close agreement with those obtained by the use of Table 27.

In the case of breakers, Table 27 calls for ratings of 80 amps and 59 amps, as is stated in the solution. However, these values are quite different from the corresponding values of 100 amps and 70 amps listed in Table 20. The last note to Table 20 states that circuit breaker settings should be gotten from Tables 26 and 27. Section 4342 states that fuse ratings are given in Table 20, but does not mention that breaker ratings are also listed in this table. Does the foregoing imply that the breaker values in Table 20 are not to be used?—D.K.

A. As covered by example No. 8, the rating of a motor branch-circuit circuit-breaker for a 25 hp squirrel cage motor is 250% of 32 amps which is 80 amps. According to Table No. 20 a 100-amp circuit-breaker is recognized as proper protection for this motor branch-circuit. According to Section 2403-b the standard ratings of circuit-breakers do not include an 80-amp circuit-breaker, so the next standard rating which is 100 amps may be used.

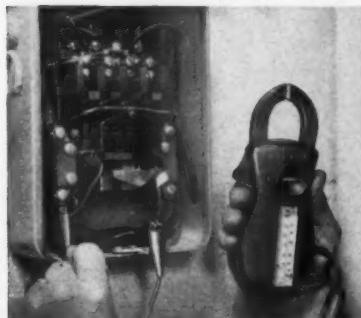
The rating of a branch-circuit circuit-breaker serving the 30 hp wound-rotor motor is 150% of 39 amps which is 59 amps. According to Table No. 20 a 70-amp circuit-breaker is recognized as proper protection for this motor branch-circuit. As covered above there is, according to Section 2403-b no standard circuit-breaker rated at 60 amps, so the next standard rating which is 70 amps may be used. In view of the foregoing there appears to be no conflict between Tables 20 and 27.

The 1956 revision of the code recognized the rating or setting of circuit-breakers in Table No. 20 as branch circuit protective devices. A comparison with the 1953 Code will show that four new columns covering circuit-breakers have been added to Table No. 20 in the 1956 Code. Previous to the 1956 the rating or setting of branch-circuit circuit-breakers were computed in accord with Tables 26 and 27, and the last fine print note following Table No. 20 advised that such procedure should be followed. In view of the 1956 revision, it appears that this note should be deleted. The same reasoning applies to the fine print note following Section 4342. It appears to me that this note should be revised as follows:

"Fuse and circuit-breaker ratings calculated on this basis are



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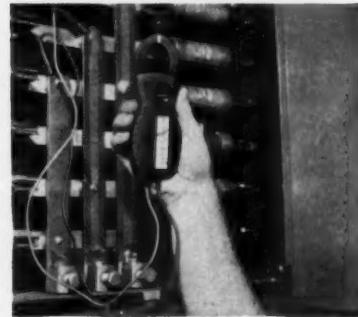
ALL-PURPOSE AMPROBE RS-3



Check resistance of
transformer windings of ballast.



Use as continuity tester
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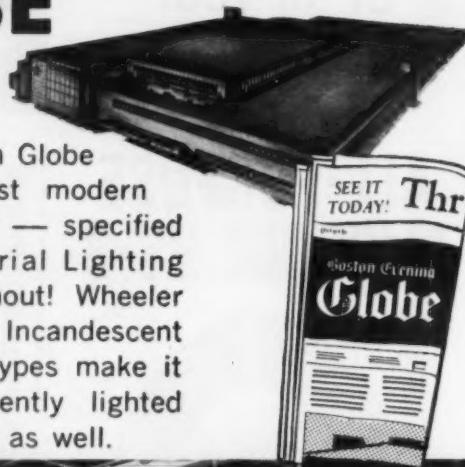


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given in columns 7, 8, 9 and 10, Chapter 10."

I believe the foregoing indicates that the circuit-breaker values given in Table No. 20 should not be ignored. While the values established are based on Tables 26 and 27, their use eliminates the necessity for computation which occasionally results in error. In view of your astute observation which has brought to light a possible need for an editorial code revision, we are calling the matter to the attention of Wm. H. Biester, Jr., who is Chairman of Panel No. 11.—B.A. McD.—10/58/4

Service Disconnecting Means

Q.-1 I would like to inquire about the use of circuit breaker panels of 6, 8, 12 and 20 circuits. As I understand it, it is illegal to put in an 8, 12 or 20 circuit breaker in a residence or elsewhere without a disconnect. Under what conditions do the six operations of the hand apply?

Does it cover only six different or separate switches or levers or does it also apply to more than six circuits or switches?—K.K.

A. I assume the question concerns the provisions of Section 2352-a which covers the code requirements for a service disconnecting means. For the benefit of our readers the rule in question is quoted in part as follows:

"Two or three single pole switches or breakers, capable of individual operation, may be installed on multi-wire circuits, one pole for each ungrounded conductor, as one multi-pole disconnect (where applicable see Section 2353) provided they are equipped with "handle ties" "handles within 1/16 in. proximity", a "master handle", or "other means", making practical to disconnect all conductors of the service with no more than six operations of the hand."

This rule is an exception to the basic provisions of this section which limits the disconnecting means to six switches or circuit-breakers. It first appeared in the 1953 edition of the code. I have endeavored to clarify this code provision by the illustrations, Fig. No. 1 and Fig. No. 2. It is significant to note that this exception applies only when multi-wire circuits are involved, and the entire assembly is approved for use as service equipment.



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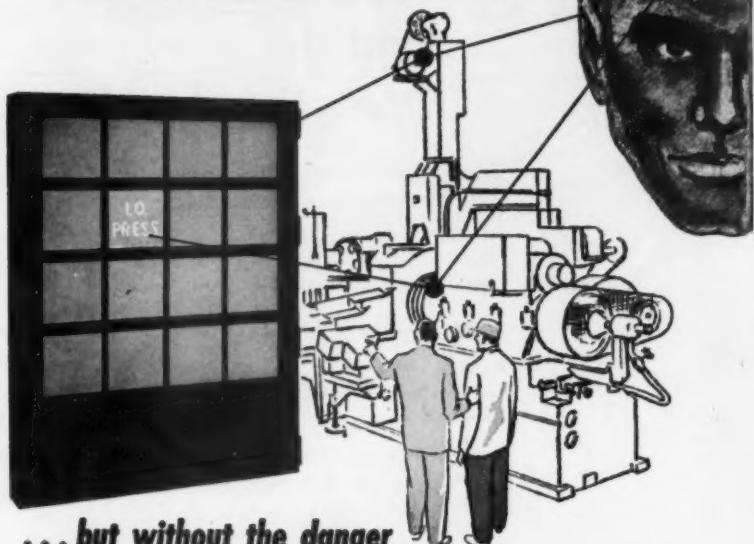
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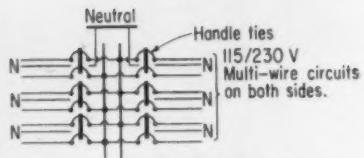
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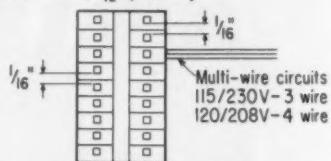
Fig. No. 1
Section 2351-A



2 single-pole breakers connected by handle ties. Total of 12 breakers which may be disconnected by six operations of the hand. Assembly approved for use as service equipment.

Fig. No. 2

Handles within $\frac{1}{16}$ " proximity



18 single-pole breakers, handles within $\frac{1}{16}$ " proximity. Service disconnected by six operations of the hand.

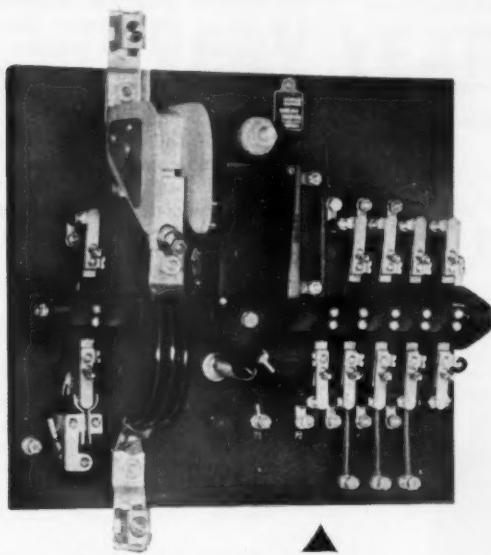
Assembly approved for use as service equipment.

Fig. No. 1 shows how the "handle tie" provision may be applied to a single phase, 3-wire, 115/230-volt, multi-wire circuit. In the case of a 3-phase, 4-wire, 120/208 wye service, we could have as many as 18 single pole breakers or switches provided each handle tie would disconnect the three phases of each multi-wire branch circuit.

Fig. No. 2 illustrates the provision which recognizes "handles within 1/16 in. proximity". Under such conditions no handle ties are required but the breakers must be arranged as shown by Fig. No. 1. In the case of 3-phase, 4-wire, 120/208-volt, multi-wire branch circuits, we could have as many as 18 circuit breakers or switches, provided the entire assembly would disconnect the service by not more than six operations of the hand. Many inspectors have criticized this rule since the intent is vague, and various interpretations will result when determining how many breakers may be operated by one operation of the hand. They also contend that this provision unduly exceeds the fundamental provision which limits the disconnecting means to six switches or circuit-breakers. It is very important to note however that such an assembly must be approved for use as service equipment. This usually involves UL approval.

Q.-2 A new line of service breakers have a distance of approximately $\frac{1}{8}$ -in. between handles. Will handle ties be required

ASCO Contactors offer design flexibility... fast arc interruption and long contact life



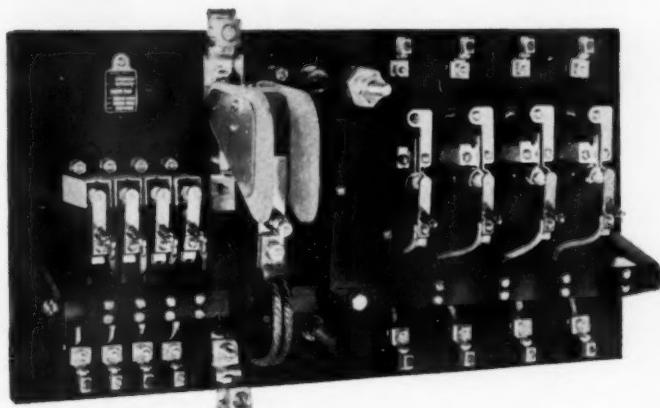
The flexibility of ASCO contactors is illustrated by this system (Cat. 128540). Any number and combination of auxiliary contacts can be provided. Here, the main contact handles the heavy armature current of a D-C machine, while the auxiliary contacts control other circuits—both A-C (inductive and non-inductive) and D-C.

This modified Bulletin 1035 Contactor simplified a customer's control problem, and introduced safety features unobtainable through conventional switching arrangements. The system demanded simultaneous switching of all poles. This was achieved in this ASCO arrangement with a single operator. Conventional switching would have required at least three operators to close all poles, introducing the hazard of failure. This Catalog 130567 Contactor has 1 pole rated 100 amperes, 600 volts A-C; 4 poles rated 30 amperes, 250 volts D-C; and 4 poles rated 30 amperes, 250 volts A-C.

Standard ASCO Contactors are designed to fit specialized control problems—lend themselves to virtually unlimited combinations and numbers of auxiliary contacts. The line is diversified and flexible, so that unusual control problems (which for other manufacturers may mean special expensive designs) are readily solved through the use of ASCO Contactors. Multi-pole, special contact arrangements, A-C and D-C pole arrangements, and many other "custom" features are readily available from ASCO standard designs.

ASCO bipolar twin-coil operators—unique in this field—are another aspect of this same design philosophy. Featuring two variable air gaps in place of the conventional single one, they result in particularly fast operation, positive closing, and minimum power loss.

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FOR THE COMPLETE STORY ON ASCO A-C AND D-C CONTACTORS, WRITE FOR CATALOG 575-3.

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Development—to test d-c dielectric strength of insulating materials and the adequacy of the electric design of insulation in equipment.

Production—for non-destructively detecting defects in electrical insulation.

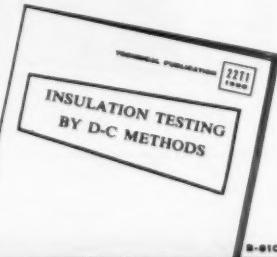


Maintenance—and preventive maintenance—for non-destructively detecting unreliable condition of electrical insulation in new or repaired equipment.

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or is the handle tie only used for disconnecting 220-volt circuits, and not intended for use on two separate circuits of 115 volts each? I am speaking of 3-wire, 115/230-volt circuits.

A. Since the distance between breaker handles exceeds 1/16 in., handle ties must be used to satisfy this rule, and the breakers must be arranged as shown by Fig. No. 1. On a 3-wire 110/220-volt circuit the two breakers connected by a handle tie disconnect the 220-volt conductors of the circuit. On a 3-phase, 4-wire, 120/208-volt circuit the breakers connected by a handle tie disconnect the 3-phase, 208-volt conductors of the circuit. The code does not recognize breakers serving two separate 115-volt circuits.

I believe Official Interpretation No. 448, issued January 9, 1958 verifies this opinion. It reads as follows:

"Question—Is it the intent of Section 2351 to recognize as one of the six disconnecting means, two single-pole circuit breakers on the same side of the line and controlling two 2-wire circuits?

"Answer—NO."—B.A.McD. - 10/58/5

Characteristics of Switches

Q. Section 4402-d states "For stationary motors rated at more than 50 hp, the disconnecting means may be a motor circuit switch also rated in amperes, a general use, or an isolating switch."

I have the following questions on this section.

1—What is the definition of a motor circuit switch?

2—What is the definition of a general use switch?

3—What is the definition of an isolating switch?

(In answering these questions I would appreciate it if you would correlate the above types with the switches listed in manufacturers catalogue as "safety switch", "disconnect switches", and "open knife switches".)

4—What is the meaning of the phrase "also rated in ampere"? Does this mean the switch must be horsepower and ampere rated, or is intended that ampere rating alone is sufficient?

(It is noted that I am unable to find a switch which is horsepower rated at more than 50 hp. The U. S. Corps of Engineers Standard

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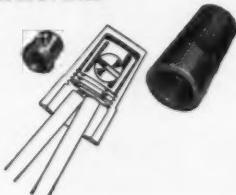
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Guide Specification calls for all switches of 30- to 400-amp capacity to be horsepower rated. For a 150 hp 480-volt 3-phase motor the switch may be rated 400 amps by the code but a 150 hp rated switch is not made commercially. This is an explanation of how the above questions arose.—D.J.N.

A. Reference to Article 100 of the N. E. Code, under the heading of Switches reveals the following definitions:

GENERAL USE SWITCH: A switch intended for use as a switch in general distribution and branch circuits. It is rated in amperes and is capable of interrupting its rated current at its rated voltage.

ISOLATING SWITCH: A switch intended for isolating an electric circuit from its source of power. It has no interrupting rating and is intended to be operated only after the circuit has been opened by some other means.

MOTOR CIRCUIT SWITCH: A switch, rated in horsepower, capable of interrupting the maximum operating overload current of a motor of the same horsepower rating as the switch at the rated voltage.

Reference to page 327 of the 1957 edition of Underwriters' Laboratories Electrical Construction Materials List further clarifies the status of such switches as follows:

"Enclosed switches with ampere rating are intended for general use. Enclosed switches with horsepower ratings in addition to ampere ratings are suitable for use in motor circuits as well as for general use."

"Enclosed motor-circuit switches are intended for use only in motor circuits, and are marked, 'Motor circuit switch'."

"Ratings of listed enclosed switches are limited to 3600-amp, 50 hp 600-volt. When rated more than 1200-amp at 250-volt or less, or more than 600-amp at more than 250-volt, enclosed switches are intended and marked for disconnecting use only."

"Ratings of listed enclosed motor-circuit switches are limited to 50 hp, 600-volt."

"Enclosed motor-circuit switches and enclosed switches with horsepower ratings are tested for interrupting capacity at rated voltage and at six times motor full load running current for alternating current ratings and at four times motor full load running current for direct-current ratings."

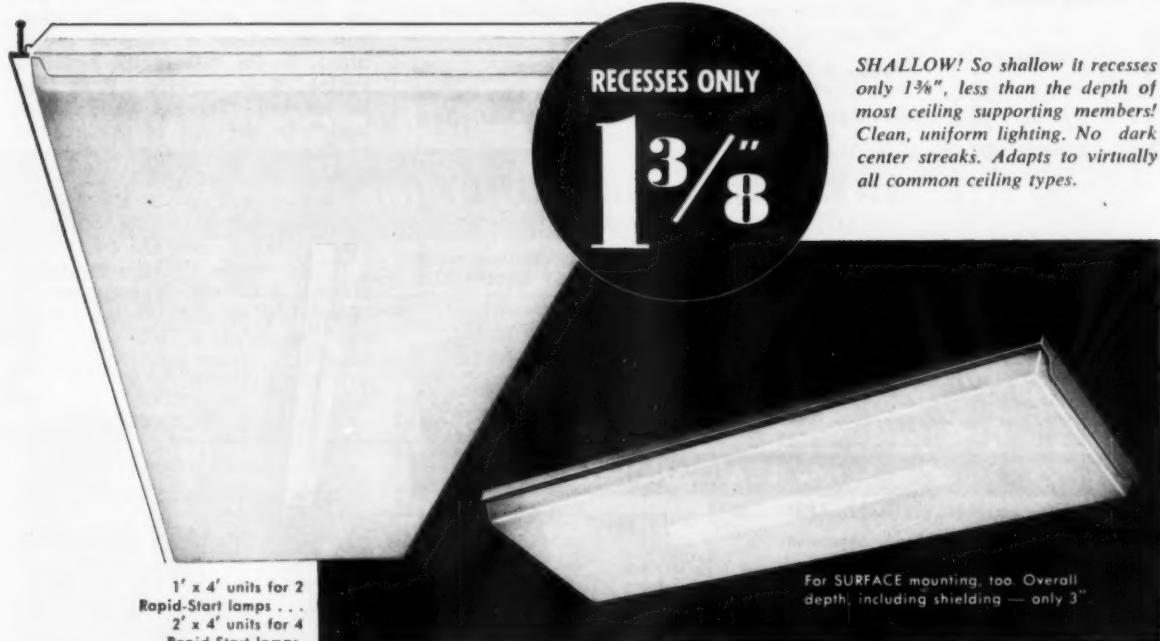
I believe the foregoing distinguishes the various types of

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A troffer so shallow it handles like tile! Designed to cut costs where it counts — on installation and maintenance time! Slender, sleek styling complemented by unique engineering

features . . . SLENDEX requires no extra depth for tilting . . . goes into the ceiling FLAT. Solves acute ceiling space conditions . . . simplifies your lighting job.



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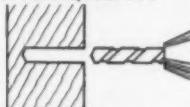
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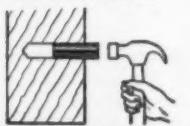


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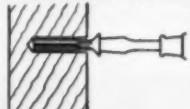
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switches mentioned in Section 4405-d. The manufacturers also have designations which distinguish the various characteristics of safety switches. It appears that Types A, C, and D may have hp ratings in addition to current ratings, but as far as the code and UL is concerned, the actual nameplate rating governs the use for which it is listed and approved.

The phrase "also rated in amperes" which appears in Section 4402-d. and pertains to motors larger than 50 hp, indicates to me that the switch may be ampere rated even though it is a motor circuit switch. Since the UL does not list motor-circuit switches with ratings larger than 50 hp, it appears to me that the code anticipates at some future time the UL approval of motor-circuit switches larger than 50 hp. It is significant to note however that a general use switch rated in amperes, with an interrupting capacity limited to its rating, is also recognized; and an isolating switch with no interrupting rating is likewise recognized. In the case of the isolating switch, it is important that they be marked "Do not open under load." In the case of the general use switch, it is designed to interrupt the full-load current rating of the motor, but under stalled rotor conditions it cannot be depended upon to safely open the circuit.

Insofar as the U. S. Corps of Engineers Standard is concerned I believe it is correct. While a switch may be rated at 400 amps, the maximum hp rating is limited to 50.—B.A.McD.—10/58/6



W. R. VOLHEYE, Portland, Ore., chairman NEC Panel 8 Committee, sees little chance of any change in present NEC raceway fill and conductor derating factors. Current disagreement in wireway and underfloor duct categories precludes general acceptance of AISI sponsored fact-finding report, he advises NFPA Electrical Section meeting in Chicago.

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	Max. Cable Dia. Table 11 N.E.C.	Number of Conductors in one Cable	Max. Cable Dia. Table 11 N.E.C.	Number of Conductors in one Cable	Max. Cable Dia. Table 11 N.E.C.	Number of Conductors in one Cable	Max. Cable Dia. Table 11 N.E.C.	Number of Conductors in one Cable	Max. Cable Dia. Table 11 N.E.C.	Number of Conductors in one Cable	Max. Cable Dia. Table 11 N.E.C.	Number of Conductors in one Cable				
COND. SIZE.																
1/2"	New Work	.450	2-4		.243		.234		.195							
	Rewiring	.479	2-4		.276		.252		.218							
3/4"	New Work	.598	5-7	2-3	.323		.311		.260							
	Rewiring	.636	5-8	2-4 2	.367		.335		.280							
1"	New Work	.762	8-14	4-7 2-4	.412	2-3	.396	2								
	Rewiring	.811	9-18	5-8 3-5	.468	2-4	.427	2-3								
1 1/4"	New Work	1.000	15-19	8-12 5-8	.543	4-5 2-3	.523	3-5 2-3								
	Rewiring	1.070	17-19	9-16 6-9	.618	5-8 2-4	.564	4-5 2-3								
1 1/2"	New Work	1.170	13-19	9-12	.634	6-8 4 2	.610	6-7 4								
	Rewiring	1.248	10-14		.721	9-11 5-7 2-4	.658	6-9 4-5 2								

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by engineers for its many developments in the lime industry, appreciates the products and services which I-T-E provides. We think you will too, and, like all who choose I-T-E Molded Case Circuit Breakers, you will appreciate the "extra quality—at no extra cost" which is built into all I-T-E products. Contact your local I-T-E Distributor, or write I-T-E Circuit Breaker Co., Small Air Circuit Breaker Division, 19th & Hamilton Sts., Phila. 30, Pa. In Canada: Eastern Power Devices Ltd., Port Credit, Ont.



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In the News

IES Conference Reviews Lighting Progress

Delegates convene in Toronto to review new developments in illumination sources, fixtures, research and applications.

For the fourth time during the 52-year lifespan of the Illuminating Engineering Society, the organization's annual Technical Conference was held in Canada; approximately 1,000 convened at Toronto's Royal York Hotel for a 5-day span beginning August 17th. With 54 Society Sections and Chapters represented, the convention presented a program of technical papers and discussions, plus a pleasant slate of social events.

President Kirk M. Reid, senior illuminating engineer for the General Electric Co., Cleveland, Ohio, stated that "psychologists tell us that about 87% of all human actions involve our sense of sight which, in turn, depends upon light." Good lighting, he continued, is surprisingly inexpensive when equated to other so-called essentials. For example, in a grade-school classroom, 70-footcandle illumination costs less than half as much as a daily glass of milk for each child. In general offices, 100-fc lighting

costs about the same as the time involved in a daily 10-minute coffee-break. And, in a typical industrial area, 200-fc lighting can be paid for if it saves workers just six minutes in every 8-hour day.

George J. Taylor of New York, eastern vice president of Day-Brite Lighting and president-elect of the IES, reiterated this theme by citing statistics indicating that 85% of all existing interior lighting is inadequate for comfortable, effective seeing. "As a reputable professional society", he said, "the IES has an obligation to carry on an educational program that will firmly establish the facts about the need for good lighting, and will also show how to attain it through intelligent recommendations, specifications, application, installation, manufacture and use of good equipment". As a step in this direction, he continued, the Society has published 51 technical booklets since the conclusion of World War II, has approved nine others for release, and has 19 additional studies nearing completion.

Richard G. Slauer, sales manager of Sylvania's fixture division in Wheeling, W. Va., and last season's general secretary of the IES, likewise stressed the Society's contribution to knowledge by reporting that 14% of the organization's gross income during 1957-58 was devoted to underwriting unrestricted light-and-sight research conducted by independent non-commercial researchers.

Blackwell Research Report

One such research project, representing eight years of vision testing and laboratory study, was discussed by Dr. H. Richard Blackwell, Associate Professor of Psychology and Physiological Optics at the University of Michigan. Reviewing the nature of the tests, equipment and procedures followed during this intensive study period, he indicated that the human eye requires between two and three times more light than is now usually provided to perform most of today's living



CROMWELL A. B. HALVORSON, former consulting engineer on lighting, was honored with the IES Gold Medal for 1958, highest award granted by this professional lighting organization for distinguished contributions to illuminating engineering.



GAVEL OF OFFICE to newly-elected president George J. Taylor (left) was presented by Kirk M. Reid, retiring president at the IES annual Technical Conference held in Toronto's Royal York Hotel this past August.

and working tasks effectively.

In this discussion, Dr. Blackwell described the complex Visual Task Evaluator used to view a practical field task of unknown lighting requirements, make technical adjustments to establish the degree of difficulty involved in seeing it, then match it with a test object of equal difficulty whose lighting requirements are known from previous laboratory data. As previously reported by EC&M (April, page 55 and June, page 86), many present recommendations will be altered drastically as a result of these studies; as, for example, the now-prescribed level of 40 footcandles for secretarial work in business offices. Measured with the Blackwell equipment, seeing tasks involved in reading shorthand notes and carbon copies require 240 fc (six times as much light as now recommended) and, even if we are willing to accept lowered proficiencies, we still should prescribe increases of 100 or 150%.

Parade of Progress

In the annual Progress Report, presented by a 19-man committee headed by E. A. Lindsay of Nela Park, conventioners found an impressive summation of the many developments that have occurred in the lamp, fixture and application fields during the past year. Descriptively titled "Reaching for the Sun", the entertainingly-staged re-



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*Now Step Up the Performance of Your
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NEW **IDEAL** FISH TAPE WINDER

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Reduces still further the work of fish tape pulling when used with an IDEAL Fish Tape Reel. As Winder is pulled around Reel it spreads the Reel housing so that the tape can be reeled in or out with least effort. Double rollers hold Winder in place as handle is rotated. Three sizes for all IDEAL Reels.

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port stressed the fact that the lighting industry has long since left moonlight values far behind and is now working towards full sunlight objectives.

In referring to recent developments of light sources, the chairman's discussion and demonstration included such items as (1) incandescent PS52 and RB52 1000-watt lamps equipped with CC-8 filaments, (2) a new filament bulb shape permitting restyling of household lamps, (3) filament lamps for multiple street lighting applications, with vibration series design features to increase service lifespans in certain installations, (4) a 300-watt vertical filament lamp to increase this line of products, (5) new neon glow lamps with brightness values 20 times greater than former types, when operated with recommended resistors, (6) a 1000-watt 115-volt PAR64 aircraft landing lamp with approximately 600,000 beam candlepower, a 10-degree vertical and 20-degree horizontal spread, (7) a PAR56 flush runway lamp operating at 6.6 amps and 200 watts, (8) a new 100-watt T-3 high-brightness quartz lamp recommended for commercial high-speed photographic printing equipment, (9) 375- and 300-watt movie lights in the R30 size for amateur camera hobbyists, (10) a whole new line of 4-pin radio-type-base projection lamps, (11) photographic flash lamps of small bulb size, producing twice as much light as former units due to the use of a new metallic foil, (12) a special long-duration photographic flash lamp recommended for use with high-speed battery-driven motion-picture cameras, (13) improved fluorescent lamps designed to lessen end blackening, increase light output and lessen depreciation, (14) a new family of dimmable low-wattage T5 diameter 400-cycle rapid-start fluorescent lamps developed for new commercial jet airlines, (15) a new 400-amp mercury lamp for 3.2-amp straight-series street lighting applications, and (16) new electrode designs that are increasing mercury lamp light outputs by as much as 65% after 8000 burning hours.

New Fixtures Discussed

In this same Progress Report, many new fixture designs were displayed and discussed, showing (1) an ingenious arrangement of reflecting vanes and reflector surfaces to completely shield the lamps, (2) a direct-indirect commercial fixture designed for extra high output lamps, (3) the use of color in steel surface panels to add variety to

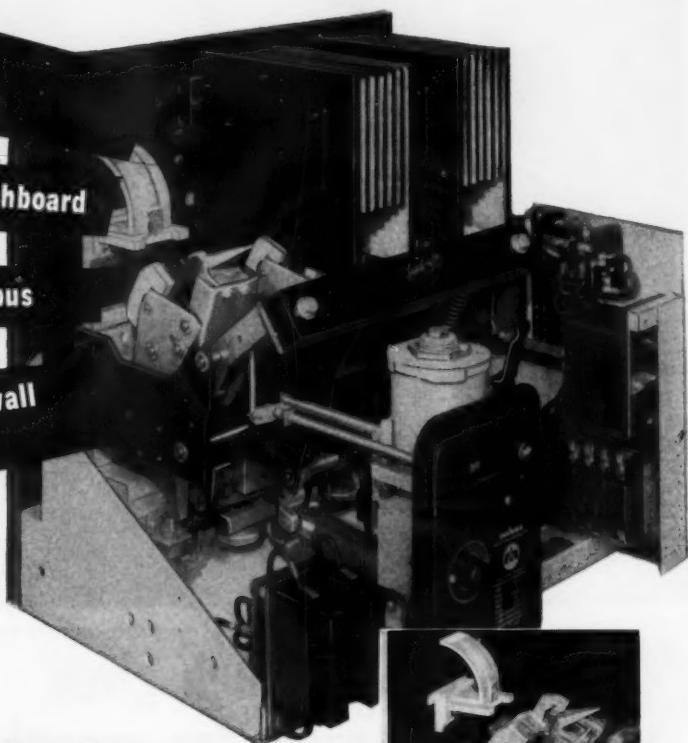
MEARS LOW VOLTAGE AIR CIRCUIT BREAKERS

600 and 1600 amp continuous,
25,000 amp interrupting at 600v

Stacks four high in standard switchboard

Removable without killing main bus

Switchboard can be set against wall
no rear access necessary



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The unusual combination of qualities listed above solves many difficult problems in switchboard layout. But Mears does not stop there. In addition you will find the same rugged dependability and advanced engineering that characterize all other Mears circuit breakers. Choice of three mountings: (1) Fixed, (2) Removable, with terminal fingers behind panel that easily disengage without killing main bus. (3) Drawout, on sturdy trucks with permanently lubricated ball bearing wheels.

Meets all NEMA and AIEE standards as certified by internationally recognized KEMA laboratories.

Mears circuit breaker features

- ... Both electrical and manual operation.
- ... Low operating temperature.
- ... Sintered silver contacts.
- ... Shockproof.
- ... Vertical plane design.
- ... Dustproof.
- ... Anti-bounce.
- ... Operating torque with 300% safety margin.
- ... Light tripping action.
- ... Low Maintenance.
- ... Extra wide range of ratings (can be sized to job).
- ... Only West Coast breaker manufacturer.
- ... Fast Delivery.
- ... 100,000 Amp interrupting capacity, 6000 Amp continuous.
- ... Fixed, removable and draw out units.
- ... The widest selection; 5 extra sizes.

Close-up of breaker mechanism. Sintered silver-tungsten contacts are used for high conductivity and non-welding properties. Secondary contacts make before and break after main contacts to reduce arcing. Although the toggle offset has three times the safety margin of the usual design, permanently lubricated ball bearings provide extremely light tripping action. Contacts lock in open position—positively no rebound. These are but a few examples of Mears advanced engineering.

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AIR CIRCUIT BREAKERS

Garnett Young and Co.: Los Angeles, Phoenix, Portland, Ore., San Francisco, Seattle.
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Here's a cable supporting system with space reserved for future needs.

Cope cable trough gives your system room for growth!

Cope cable trough design gives you greater load carrying capacity per dollar now—plus built-in system expansibility that will minimize the cost of future system expansion. A single 24" wide section of Cope cable trough supports as many cables as 16 lengths of 4" conduit. Additional cables can be quickly and easily laid in existing trough as new equipment installations require. The lower first cost of a Cope cable trough installation saves you money a second time when you need to increase or expand your power distribution system!

Reduced System Maintenance Costs. Easy-to-get-at Cope cable trough also eliminates costly maintenance problems down the line. Once cable is laid in Cope expanded metal trough, it's readily accessible for easy inspection, repair . . . or re-routing when system

changes are required. And greater installation flexibility of lightweight Cope cable trough and a complete line of system accessories and fittings reduce design time up to 25% for laying out the most complicated system . . . assure easy system maintenance even in the most cramped quarters.

Cut Costs Three Ways. You save three ways when you specify Cope cable supporting systems with pin-type coupler . . . trough, ladder or channel.

- LOWER FIRST COST
- LOWER INSTALLATION COSTS
- LOWER SYSTEM MAINTENANCE COSTS

Discuss these advantages for your installation with a qualified Cope representative—or write to T. J. Cope Division, Rome Cable Corporation, Collegeville, Pa.



T. J. COPE Division
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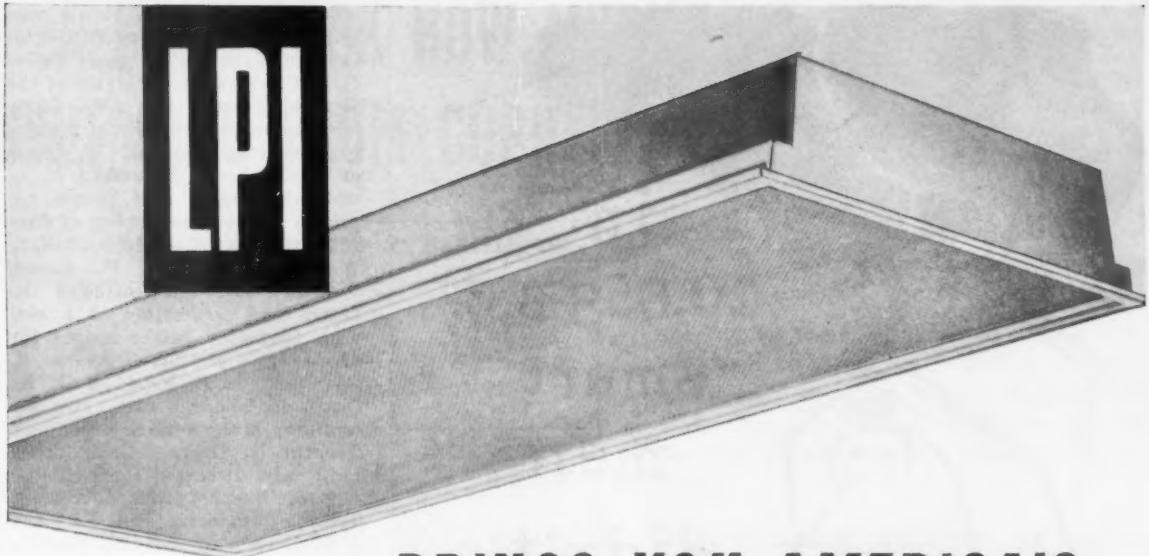
CHARLES L. AMICK, chairman of the I.E.S. National Technical Conference Committee, presided at the Society's opening session in Toronto, while **Joe W. Bateman** (right), chairman of the Conference Executive Committee, officiated in a similar capacity at the closing banquet.

decorative side panels, (4) a new method of installing flange troffers to eliminate the use of "U" brackets, (5) a new louver fin designed with a parabolic contour to reflect light downward into the work surface and away from critical viewing angles, (6) a new slender troffer with a recessed dimension of only 1½-in. for use in minimum-cavity locations, (7) the first dust-ignition-proof fixture for mercury lamps for use in Class 2 Group E, F and G locations, (8) the first explosion-proof fixtures for mercury lamps in hazardous Class 1, Groups C, E and D locations, (9) an all-purpose dust-tight prismatic reflector refractor industrial unit, and (10) a new 12-in. traffic signal for use on high-speed highways where greater distances are required for reducing speeds.

Lindsay then illustrated the application of these and numerous other lamp and fixture developments by showing an impressive series of slides pertaining to indoor and outdoor, residential, commercial, industrial, domestic and foreign installations.

Technical Papers

During the course of the conference, more than 40 papers were presented covering light sources, applications, research, calculations, photometry, residential installations, street lighting and daylighting problems. Of these, attending electrical contractors, architects, consultants and maintenance engineers concentrated particular interest upon discussions by W. A. Dalrymple and C. A. Albini, Amalga-



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DIFFERENT SIZES and TYPES

Designed and engineered to make Troffer selecting simple, easy and foolproof

This single troffer line will answer almost any recessed fluorescent lighting problem. No matter how you wish to design, control or utilize illumination an L.P.I. Variform 24" troffer will give you these outstanding advantages.

1. MODULAR—2'x2' and 2'x4' units
2. LAMPS—2, 3 or 4, 24" or 48"
3. RECESSING—Flush, snap-in, lay-in or flange for all types ceilings.
4. LIGHT CONTROL—6 DIFFUSERS—Polystyrene eggcrate, No. 70 Corning, Albalite, Pattern formed Vinyl, Plain formed Acrylic, and Ventrolens.

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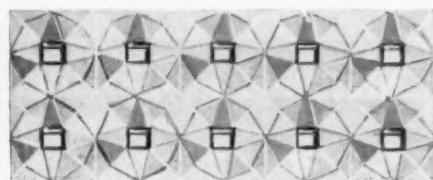
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troffer to properly fit any of more than 60 different types of ceiling construction of leading manufacturers. Eliminates guess-work, compromise and costly errors in ordering. Write for your copy today.

Featuring the Amazing New VENTROLENS

This new exclusive L.P.I. lens diffuser is as functional as it is beautiful. Made of .135" light stabilized polystyrene with an exterior surface of 200 octagonal prisms, it has exceptional low-brightness control with high efficiency. Write for sample.



PLAN VIEW



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equipment from

NELSON Electric MANUFACTURING CO.
TULSA, OKLAHOMA

a major source of electrical
control equipment for industry

Write for this free booklet just off the press. The Pictorial Index illustrates the wide range of electrical control equipment manufactured by Nelson.



mated Electric Corp., Toronto, who jointly analyzed the new floodlighting installation at Niagara Falls; C. N. Clark and N. F. Myers of the General Electric Co., Nela Park, who discussed economics of fluorescent reflector lamps; E. W. Beggs of Westinghouse, Bloomfield, N. J., who analyzed a new simple approach to group relamping of fluorescent lamps; W. H. Johnson, J. L. Winpisinger and J. F. Roesel, Westinghouse, who reviewed the design and application of a new high frequency power source for fluorescent lighting; Sylvester K. Guth and J. F. McNeilis, G. E., Cleveland, who evaluated glare discomfort; Morgan Christensen and Quentin D. Dobras, G. E., Nela Park, who discussed the combination of mercury and fluorescent lighting in industry; S. C. Peck and J. R. Keenan of Sylvania Electric Products, Salem, Mass., who discussed outdoor applications of new reflector contour designs for higher output fluorescent lamps; W. M. Waldbauer of Westinghouse, Cleveland, Ohio, who analyzed a new technique for producing highway lighting without glare; George J. Taylor and R. D. Bradley, Day-Brite Lighting, who presented new maintenance factors and features of industrial fluorescent luminaires; J. S. Hamel, consulting engineer of Burbank, Calif., who discussed integrated ceilings, and Gyorgy Kepes and R. O. Preusser (of M.I.T.), D. E. Spencer (U. of Conn) and L. F. Martin (Marlux Corp.) who jointly suggested some possibilities for the enrichment of luminous ceilings.

Gold Medal to Halvorson

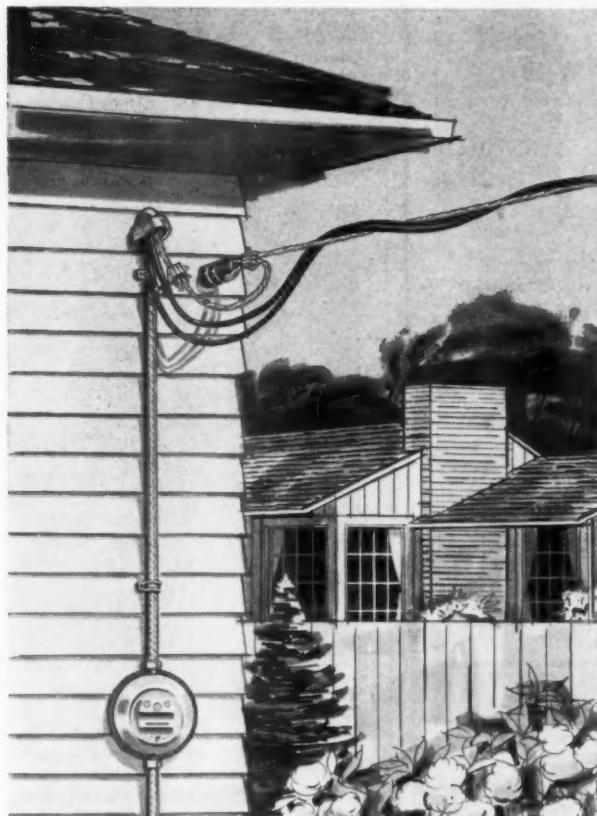
Recipient of the 1958 IES Gold Medal (the Society's highest honor) was Cromwell A. B. Halvorson, retired Lynn, Mass., lighting engineer, who designed the luminous arc lamps that lighted America's first "Great White Way" in 1911, and who played a role in the development of every major electric light source.

Also honored at this conference were ten members of the IES, each with experience in the lighting profession ranging from 15 to 30 years. This mark of outstanding distinction in the lighting profession is awarded only after careful scrutiny of a candidate's professional achievements and approval by the Society's governing Council. This year the recipients included Carl J. Allen, school lighting specialist, General Electric Co. lamp division,

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COST COMPARISON—ALUMINUM VS. COPPER							
Service Entrance Cable							
Concentric Uninsulated Full Neutral, Braid Jacketed Underwriters' Type SE, Style U, 75° C. Operation							
SERVICE		ALUMINUM		COPPER		SAVINGS WITH ALUMINUM	
Amp- ères	Feet	Con- ductor Size AWG	Cable Cost \$	Con- ductor Size AWG	Cable Cost \$	\$	%
100	20	2	5.50	3	9.10	3.60	40
.....	40	2	11.00	3	18.20	7.20	40
.....	60	2	16.50	3	27.30	10.80	40
150	20	2/0	9.46	1/0	21.48	12.02	56
200	20	4/0	12.80	3/0	30.28	17.48	58

NOTE: Based on prices in effect as of September 15, 1958.



Check the table...at today's prices, braided aluminum SE-U saves you money over copper right down the line!

Note that the cost of #2 aluminum SE-U is 40% lower than #3 copper SE-U. With the trend toward larger sizes, savings with aluminum become even greater—up to 58% for 200 ampere service! Neoprene jacketed aluminum cables offer similar savings.

FREE BROCHURE GIVES YOU THE FACTS

Our new, free brochure, "KW Service Entrance Cable," points out the distinctive characteristics of both braided and neoprene jacketed aluminum cable, and fully explains why this cable offers definite advantages over copper.

It also describes and illustrates applications of SE-U Cable, as well as Single Conductor in Conduit, and contains a list of manufacturers of accessories for both applications.

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SINGLE POLE SWITCH AND "T" SLOT RECEPTACLE

Switch Rating: 10A-125V "T", 5A-250V
Receptacle Rating: 15A-125V

Heavy duty switch "T" Rated. "T" Slot Receptacle has double wipe contacts for better contact. Switch and receptacle independent of each other on same circuit. Outlet can be wired independently or controlled by switch.

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Switch Rating: 10A-125V "T", 5A-250V
Pilot Light Rating: 75W-125V

Heavy duty switch. Pilot light internally connected to positive side of switch. Can be wired to control light with pilot light indicating "on" or "off" or pilot light only controlled by switch when used as a nite lite.

DUPLEX SINGLE POLE SWITCH

Rated Each: 10A-125V "T", 5A-250V

Two heavy duty switches "T" rated. Both switches independent of each other on same circuit.

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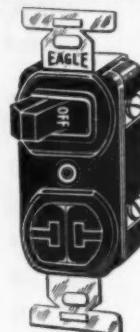
- 1. Double wipe, phosphor bronze "T" contacts
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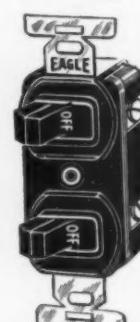
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Cleveland, Ohio; Svend W. Brunn, consulting illuminating engineer, Ridgewood, N. J.; John M. Chorlton, superintendent of maintenance and construction for the Toronto, Ont., Board of Education; James L. Cox, vice president in charge of engineering, Duro-Test Corp., North Bergen, N. J.; Hedley F. Davidson, chief engineer, Curtis Lighting of Canada, Ltd., Toronto; Hans U. Hjermstad, vice president, engineering, Sola Electric Co., Chicago; Richard N. Thayer, manager of discharge lamp design engineering, General Electric Co., Cleveland; Harold F. Wall, general superintendent, Public Lighting Commission, Detroit; John S. Walsh, director of commercial sales, Pacific Gas and Electric Co., San Francisco, and Robert L. Zahour, manager, illuminating engineering section of the Westinghouse Lamp Division's commercial engineering department, Bloomfield, N. J.

Fire Detection Required in New Quincy Homes

All new structures used for residential purposes in the City of Quincy, Massachusetts, are now required to have permanently installed automatic, heat-activated, fire detection alarm systems under a building code amendment adopted in that community which became effective July 1, 1958.



OMAHA TRIO checking a Code interpretation at Western Section, IAEI convention in Detroit are: (L to R) Walter Farwell and Robert Macfie, Omaha Public Power District; and A. E. Cronemeyer, chief electrical inspector, City of Omaha, Neb.



HUGH P. SCOTT to cover Western states from new San Francisco office.

Hugh Scott to San Francisco

Hugh P. Scott, whose by-line as Industrial Editor is well-known to our readers, is heading West to establish a new editorial branch office in San Francisco for *Electrical Construction and Maintenance* at 68 Post Street. He goes with the new title of Associate Editor and will be responsible for our editorial coverage of the eleven Western states and Alaska. No stranger to the West, Mr. Scott has made many field trips through the area, which he will cover now from his new San Francisco headquarters.

In addition to its New York home office, *Electrical Construction and Maintenance* also maintains an editorial branch office in Chicago at 520 North Michigan Avenue staffed by Associate Editor August Eckel and Assistant Editor William J. Martens.

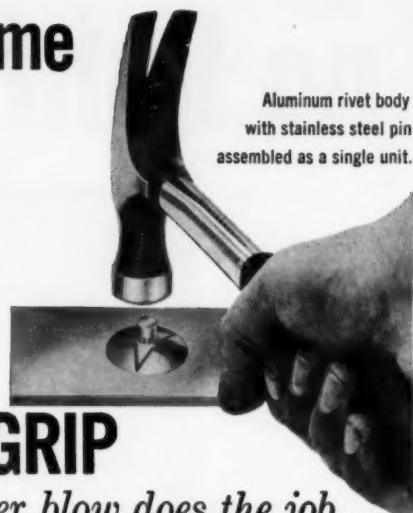
Midwest Inspectors Convene in Detroit

Proposed changes in the 1959 edition of the National Electrical Code, electrical safety problems, association articles amendments and a new slate of officers comprised the 3-day agenda of the 54th Annual Convention of the Western Section, International Association of Electrical Inspectors held September 7-10 at the Sheraton Cadillac Hotel in Detroit. More than 450 members and guests registered for the 19-state conference and product exhibit.

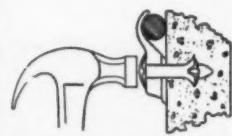
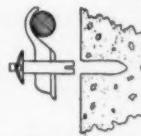
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Aluminum rivet body with stainless steel pin assembled as a single unit.



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For quick installation of lighter weight fixtures in masonry. Made of lead, it will expand without turning in soft material. Withstands extreme changes in temperature and is not affected by moisture or chemicals. For wood screws Nos. 6 to 24, long and short. Catalog No. 400.

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Spring-Wing Toggle Bolts

For use in hollow walls and horizontal surfaces where gravity action toggles are difficult to set. Rustproof. Available with round, flat, mushroom and nut-type bolt heads. Springin bolt diameters $\frac{1}{4}$ " to $\frac{1}{2}$ ". Catalog No. 5500. Snapin, $\frac{1}{4}$ " to $\frac{3}{8}$ ". Catalog No. 3000. Both in lengths 2" to 6".



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Precision die-cast expansion shield of rustproof alloy. Provides secure anchorage for lag screws in brick, stone and other types of solid masonry. Heavy external corrugations assure powerful gripping action. Use with lag screws $\frac{1}{4}$ " to $\frac{3}{8}$ ", long and short. Catalog No. 1800.

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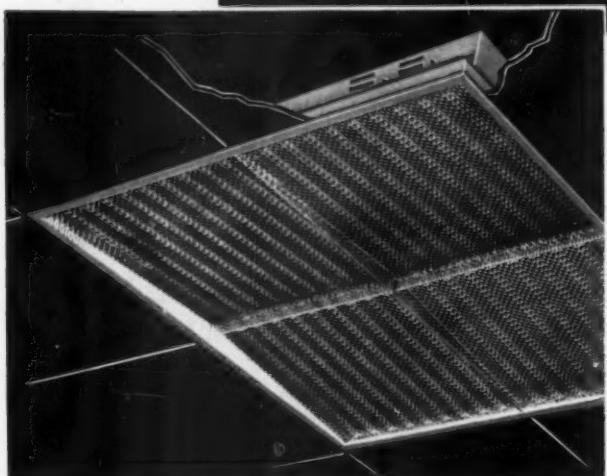
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IAEI PRESIDENT Dewey L. Johnson reports to recent Western Section convention on NEMA-IAEI resolution of non-interchangeable circuit breaker problem. Revised proposal is now ready for NEC Correlating Committee approval and inclusion in the 1959 Code.

In his opening address, E. H. Rueppel, Louisville, Ky., president of the 2150-member western section, pointed up the need for more salesmanship in the promotion of electrical safety and adequacy. He sees a vast rewiring market ahead and urged all present to sell up wiring (particularly residential type) above mere code requirements; believes too much emphasis is being placed on larger residential services and not enough on the need for additional branch circuits; advocates a limitation of ten outlets per lighting circuit. Mr. Rueppel suggested inclusion of drawings and diagrams in the NEC to amplify regulations for services, air conditioning equipment, etc., and short summaries following specific articles for clarification and explanation. On the subject of state licensing, he warned against asking legislatures for too much and ending up with nothing. Ask for a simple bill and keep it out of politics, Rueppel advocated.

Operations of the IAEI international office were outlined by international president Dewey L. Johnson, Atlanta, Ga. The new I.O. set-up with the IAEI secretary-treasurer paid by the association (NFPA field engineer only as a consultant), the increased work load of an expanding membership, and membership request for Chapter visits by the I.O. will require additional financing and the addition of a technical assistant to the staff, Johnson noted. To achieve this, he recommended ratification of a new dues structure proposed by the Executive Council plus additional articles of association amendments to expedite operation of the international office. As to association progress, Mr. Johnson

pointed with justifiable pride to the increasing membership, the mandatory requirement of Type S fuses in the new code and the recent NEMA-IAEI agreement on the non-interchangeable circuit breaker proposals (EC&M, Sept. 1958, page 190). He emphasized the need to secure, and finance, capable IAEI representation on future Code Making Panels.

Technical Papers

Three electrical system protection subjects were covered in the technical portion of the program. D. W. Rice, conduit products manager, National Electrical Products Corp., Pittsburgh, presented a paper he co-authored with C. L. McHattie, NEPCO plating and finishing engineer. In it, he highlighted the losses incurred through metal corrosion; outlined the various methods of applying a zinc protective coating to conduit; emphasized, with corroborative independent test data, the additional protection provided by the new plasticized and pigmented (green color) modified polyvinyl chloride resin jacket baked on both interior and exterior walls of Sherarduct conduit. This latest development, he noted, culminated some 30 years of research study of corrosion resistant coatings for electrical conduit.

V. G. Vaughan, consultant, Corpus Christi, Texas, in a paper co-authored with A. P. White, product development manager, Spencer Division of Metals & Controls Corp., Attleboro, Mass., discussed the role of IAEI Fire Reports in the development of safe products—particularly in the temperature control line. If the present downward trend in electric motor fires is to



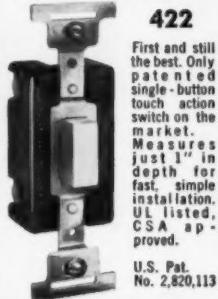
NEW PRESIDENT of Western Section, IAEI, L. S. Crain of Lincoln, Neb. addresses inspectors following his unanimous election at recent Detroit convention. Section he heads has some 2150 members from 19 states.

NEW WIRING DEVICES

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First and still the best. Only patented single-button touch switch on the market. Measures just 1" in depth for fast, simple installation. UL listed. CSA approved.

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Single pole switch and "T" slot receptacle independent of each other on same circuit, or receptacle can be controlled by switch. UL listed.

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A Rodale exclusive. The economical way to convert a single grounded receptacle to an approved grounded 3-way outlet. UL listed, CSA approved. Patent applied for.

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Connector:
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Heavy duty all-rubber connector body has patented concealed slot reinforcements to prevent incorrect blade insertion. Cap interchangeable with other 3-wire parallel grounded devices. UL listed, CSA approved.

NIGHT LIGHTS

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Slumber-Glo
Plug-In
Night Light

The night light as close as the nearest receptacle. Now in rose, blue, ivory, brown. Vertical mounting: a Rodale exclusive. UL listed.

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Safety-Glo

Practical, easy-to-operate safety light. With or without switch. Ideal for residences, hospitals, theaters, hotels, commercial buildings. UL listed.

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THE "FORWARD-LOOKING" APPROACH: that's what we call the new Rodale wiring devices. Some, like the Grounded Cube Tap, are Rodale "exclusives". Some, like Touchette, were the first of their kind on the market. All have been designed, tested, re-tested and perfected to save time . . . make installations easier.

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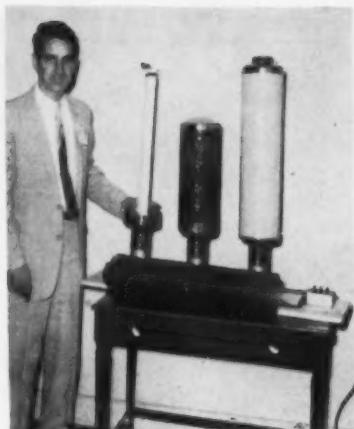
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C. B. McCOY, electrical inspector, Pontiac, Mich., explains construction features of moderately priced residential fluorescent post-lights he developed with J. W. Emerson, Pontiac chief electrical inspector. Units have polished metal end-bells and plastic diffusing cylinders.

be maintained, Mr. Vaughan sees the need for more and better UL testing of new motors and more accurate temperature measuring techniques because of the new higher UL motor temperature limits. He also sees a full line of thermal-protected fluorescent ballasts and the possibility of thermal protection on TV sets to cut the rising curve of TV fires.

The need for strict adherence to proper grounding techniques for electrical distribution systems was covered in a blackboard talk by E. C. Soares, Industrial Engineering Services, New York. He noted that on 90% to 95% of larger installations most paths to ground from conductor enclosures do not have sufficient capacity for full safety; recommended that the neutral from a 3-phase, mid-point grounded system be carried in power conductor enclosures as well as lighting raceways.

Code Discussion

Significant Code changes reflected in the Proposed Amendments to the 1956 Edition of the National Electrical Code (NFPA pamphlet 70PR-1958) were emphasized by Frank Stetka, Chicago, NFPA field engineer and secretary of the NFPA National Electrical Code Correlating Committee. Among them are: new numbering system for articles and paragraphs; mandatory use of Type S fuses; non-interchangeability of circuit breakers (not in pamphlet, but revised NEMA-IAEI proposal now in hands of Code Making Panel); clarification of 12-ft receptacle rule; man-

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datory requirement of 100-amp, 3-wire service for residences with initial load of 10 kw or more; revision of unit loads and demand factors; requirement of two appliance circuits in a residence; extension of grounding type outlets to other parts of a residence; new table of demand factors for electric clothes dryers; possible revision of Table 4 (conduit fill) based on report of Technical Subcommittee on Raceway Fill and Heating of Conductors. Code Panels submit final reports of amendments and changes to the Correlating Committee January 30, 1959. The 1959 NEC will be published in September of that year.

Comprehensive floor and panel discussion of field problems and code interpretations gave inspectors an opportunity to learn how their associates in other parts of the midwest solved mutual problems. Moderating the discussion was W. P. Hogan, Jr., Chicago. Assisting him on the panel were: H. B. Love, Detroit; Gordon Maltby, Evanston, Ill.; Charles Stasek, Cleveland; J. E. Fisher, Elkhart, Ind.; and James Conlon, Chicago.

The problem of enforcing code requirements can be reduced to a minimum through a good public relations policy, A. H. Welkin, Ft. Wayne, Ind., told the group. Get to know your city officials, become acquainted with your city editors and reporters as well as architects and engineers in your area, he advised.

Conference Action

Through resolutions and floor votes, the Western Section delegates took the following actions:

Requested that the NFPA Electrical Correlating Committee make



GO THE SECOND mile and endorse Housepower and similar Beyond-Duty Features of modern residential wiring, chief electrical inspectors A. H. Welkin, Ft. Wayne, Ind., and J. Gordon Maltby, Evanston, Ill., urge fellow inspectors at recent Western Section, IAEI convention in Detroit.



Get EXTRA VALUES from G.E.'s Outdoor Lighting products



FORM 406
FLUORESCENT LUMINAIRE

INTERNAL FAN COOLING

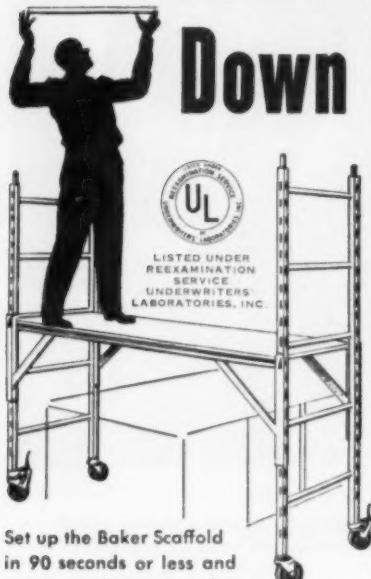
- Air-circulation system—a G-E exclusive—boosts light output of luminaire up to 25%.
- Four Power Groove lamps generate 37,200 lumens.
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DISCUSSING electrical inspector participation in 1959 National Electrical Week promotion are (L to R); S. B. Todd, Chicago, past-president, IAEI; John C. Denner, chief electrical inspector, Saginaw, Mich.; and H. B. Love, chief electrical inspector, Detroit.

the effective date of mandatory use of Type S fuses concurrent with the publication of the 1959 National Electrical Code. The proposed code change would make this date January 1, 1961.

Approved the recent NEMA-IAEI ampere-range categories for non-interchangeability of circuit breakers in the 0-250-volt classification (see EC&M, Sept. 1958, page 190).

Approved continued sponsorship of National Electrical Week with a suggested minimum annual contribution of \$100. NEW next year will be the week of February 8-14.

Objected to the marketing of a tool for easy removal of Type S fuse adapters, suggesting that this device might nullify the safety features of the mandatory requirement of Type S fuses in the Code.

Ratified changes in the IAEI Articles of Association.

Ratified increased dues proposal calling for \$10 annual dues for active members; \$15 for associate members; a new \$10 associate classification for journeymen and wiremen.

Rejected the proposed per capita tax distribution of the new dues income primarily because Chapters would receive less financial support than they get now.

New Officers

At the final business session L. S. Crain, Lincoln, Neb., was elected president of the Western Section. W. E. Stewart, St. Louis, Mo., is 1st vice president; L. W. Roper,

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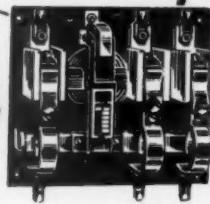
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FLA. • NEW YORK, N.Y. • NEWTON CENTRE,
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All parts accessible for easy inspection, maintenance and replacement.

Full floating armature for perfect magnetic seating. Minimum AC hum. Copper to copper contacts. Quick opening, heavy compression springs assure contact pressure. Coil withstands 24 hr. continuous duty. Capacities to 400 amps.

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#20 REPLACEMENT BRUSH ASSORTMENT

services **23**
FAMOUS HAND-TOOL BRANDS
... covers 803 models!



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BRUSHES
DO THE
WHOLE
JOB!

Husky compartmented dispenser container FREE! No hidden cost. No assessment for the box. A carefully varied selection, made after an exhaustive study of our sales records. Enough of the right brushes . . . fewer of others.

The only selection of its kind!

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The OHIO CARBON CO.

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Council Bluffs, Ia., 2nd vice president. D. M. Lines, Topeka, Kansas, is the new secretary-treasurer, taking over the duties of the late H. L. Parks of Charleston, W. Va.

Members elected to the Western Section Executive Committee are: W. P. Hogan, Jr., Chicago; C. B. Tressel, Canton, Ohio; H. B. Love, Detroit; R. B. Thomson, Kansas City, Mo.; L. E. Peterson (Associate), Sycamore, Ill.; R. S. Davis (Cooperating), Detroit; and past president, E. H. Rueppel, Louisville, Ky., as ex-officio member.

Following spirited floor balloting, George Monroe, Springfield, Mo., and A. H. Welkin, Ft. Wayne, Ind., were re-elected as Western Section representatives on the IAEI Executive Council. C. M. Park, Chicago, is alternate member; and D. M. Lines, Topeka, Kansas, ex-officio member.

The Western Section's 55th Annual Convention will be held in Milwaukee, Wisconsin, at a 1959 date to be announced later.

NISA News

Trio Electric of Philadelphia and B&H Electric Motor Service of Chester, Pa., are new members of NISA's Quaker City Chapter.

The organization's fall season began rolling along nicely on the topic of ball bearings, a discussion led by Marlin-Rockwell Corp.'s E. J. MacAvay and Stephen Skidmore.

NISA regional director Jack Person gave a report of the NISA Jubilee Celebration, held last May in New Orleans.

Plans were also announced for



BETTER TESTING and temperature measuring techniques for new higher UL temperature limits on motors will be needed if current downward curve of motor fires is to be maintained, V. G. Vaughan, consultant, Corpus Christi, Texas, tells western electrical inspectors at recent Detroit convention.



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FLUORESCENT SYSTEM

NEW STREET- LIGHTING CONCEPT

- Ideal for "prestige" lighting of business whiteways.
- Highest utilization efficiency of any fluorescent system.
- Greater driver comfort.
- Uni-directional reflectors in parallel units aim light across street.
- Parallel fluorescent units, 18,600 lumens each; transverse unit, 18,600 to 55,800 lumens.

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NOW—AN ENTIRELY NEW CONCEPT IN

watertight service entrance connectors

THIS exclusive M&W fitting introduces a new high in simplified installation. The hex-nut casting compresses the neoprene gland directly into the hub of the meter socket. This permits a faster, easier installation. The conical metal sleeve gives ample take-up around the cable, prevents cable-twisting, and makes a more adequate seal with neater appearance.

New HNS-23 M&W Connectors save time, cut costs, provide ONE connector to handle ALL sizes of 100-amp rated cable. Write today for sample fitting, prices and details.

Non-Water-Tight Connectors — Ground Clamps — Service Entrance Mast Kits — Service Entrance Caps, Straps and Sill Plates — BX and Romex Connectors



Electrical Fittings

The M. & W. ELECTRIC MFG. CO., Inc.
EAST PALESTINE, OHIO

EAST PALESTINE, OHIO



EXPLODED VIEW
shows hex-nut casting
which compresses into
threaded motor hub.

Patent
Applied
For



MO-KAN DELEGATES to the Western Section, IAEI convention in Detroit included (L to R); R. B. Thomson, Kansas City, Mo.; C. J. Anderson, Burlington, Kan.; Albert Karl, Kansas City, Kan.; V. J. Elliot, Topeka; and Herman Beyreis, Kansas City, Kansas.

the November meeting, a shop discussion, and for a February showing of shop ideas. A committee composed of Jim Preuity, of Penn Electric Motor Co.; Ralph Kufen, Hatboro, Pa. show owner; and Art Fowler, Pennsylvania Carbon Co., Philadelphia, is responsible for the February meeting.

Using the new Allis-Chalmers Silco-Flex insulation, Turner Electric Co. of Jacksonville, Fla., completed rewinding a 350-hp, 1200-rpm, 3-phase, 60-cycle, 4160-volt motor for the Hudson Pulp & Paper Corp., Palatka, Fla. during an open house last August, attended by representatives from local plants as well as the power generating stations of the city of Jacksonville.

Better merchandising methods, thanks to assistance from manufacturers, are being utilized by more motor shops. Allis-Chalmers' "Showcase on Wheels" recently made appearances at Monarch Electric Supply Co., La Salle, Ill., and Keck Electric Corp., Joliet, Ill.

At La Salle, the 35-ft trailer display of motors, controls, pumps and drives attracted 135 engineers, superintendents, foremen and maintenance engineers. At the Keck shop, personnel of the firm accompanied the trailer as it made the rounds of several plants the shop serves. Taking the display to the customers' plants according to a prearranged schedule made it possible for many engineers and plant personnel to inspect the new equipment.

Motor shop men in the Southwest attended the opening of Essex Wire

Please send me the Sprague catalog "Power Factor Correction".
Name: _____ Title: _____ (333)

Install Sprague Unipak power-factor correction capacitors right at the motor for a perfect match. Available in over 125 designs from $\frac{1}{2}$ to 15 KVAR, these units are completely self-contained. There are no extra switches or fuses to install. And unique Sprague "unit-cell" construction gives you maximum reliability and long-term trouble-free service.

Write for complete information in Bulletin PF-1150, available free on request to the Industrial Capacitor Division, Sprague Electric Co., 333 Marshall St., North Adams, Mass.

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The mark of reliability

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CAN YOU LOOK DOWN YOUR AISLES



MULTI "ILE LITES"

Will give uniform illumination where needed to the top shelf as well as to the bottom shelf.

Reflector is porcelain enameled—the best for life-time cleaning.



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MINERALLAC BEAM CLAMPS

FOR
MOUNTING
HANGERS
ON I-BEAMS



Mounts Minerallac hangers No. 6 to No. 6 on I-beams safely without necessity of drilling holes. Made of heavy gauge zinc plated steel with deep drawn ribs to give needed strength, these durable, light weight beam clamps have 1/4-20 tapped holes—will fit beam flanges up to 1/2 inch thick. Furnished with case-hardened set screw. Low cost.

Order From Your Electrical Wholesaler
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MINERALLAC ELECTRIC COMPANY
25 North Pearia St. Chicago 7, Ill.

MINERALLAC

Co.'s new two-story warehouse in Dallas on September 1. Branch manager is Jack M. Brewer, formerly of Smith-Perry Corp., Dallas.

When J. B. Johnson of J&J Armature Works, Tyler, Tex. and his crew left their shop for lunch one day last summer, they returned to find the first floor covered with water after a flash flood. Damage was estimated at about \$5,000.

The Toledo (Ohio) Armature Works has erected a 40- by 80-ft addition to its building at 420 Knapp St. The new section is designed for large equipment, is equipped with a crane and hoist installation.

The Great Lakes Chapter has appointed a committee to write a history of the group, one of the association's most active. Members are urged to send photos, facts, reminiscences, etc. to Pat Moran, Standard Electric, 6234 2nd Ave., Detroit 2, Mich.

The hat which Great Lakes Chapter bought for G. E. Jones, after losing a bet on convention registration, is finally resting where it belongs—on the latter's head. There are 131 autographs of Great Lakes members on the expensive Texas-Style hat which was finally shipped to Mr. Jones' Amarillo, Texas, office last month.

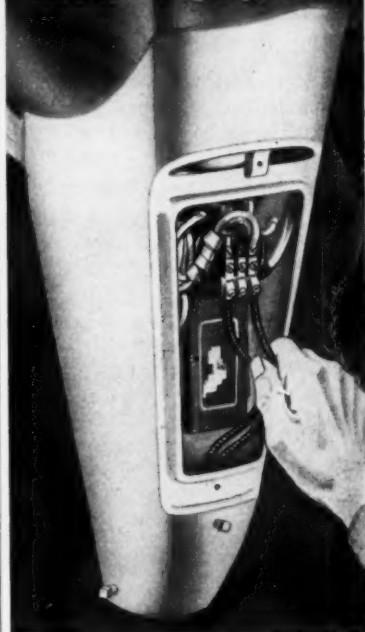
Mason Green of Barker-Fowler Electric, Lansing, Mich., was host to members of Western Michigan and Great Lakes chapters at a meet-



MOTOR REPAIR division of Grand Rapids Industrial Electric Company, Grand Rapids, Mich., is the responsibility of shop superintendent Roy E. Heald, whose experience and know-how are backed by modern equipment.



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NEW BUILT-IN BALLAST

- Only two terminal connections—saves up to 30 minutes per unit installation.
- Eliminates need for ballast-adapters or transformer-base poles—saves \$30 to \$65 per pole.
- Same outstanding lighting efficiency you have experienced with the General Electric Form 400—best in the industry.
- Low ballast losses.

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DRILL CONCRETE in SECONDS

Not Minutes Not Hours

The Penndrill Model "E" is a complete drilling unit, easily operated by one man and drills holes from 1 to 14 inches in diameter up to 19 inches deep.

Requires no set up time and presents no problems for drilling holes close to walls or in corners—one man can carry it up stairs.

Using diamond bits, it drills neat, clean holes vertically, horizontally or at any angle in concrete, asphalt, marble, granite, including any pipe, conduit, steel, etc. that might be encountered in the drilling.

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CORROSION PROTECTION features of vinyl plastic coating (MCV-1) on zinc-coated conduit is emphasized by D. W. Rice, conduit products manager, National Electrical Products Corp., during a technical report of NEPCO's new vinyl-coated Sherarduct at Western Section electrical inspectors' convention in Detroit.

ing of the two groups August 18. Fifty-five attended.

Florida members mixed sunshine and shop talk at their two-day meeting in Sarasota last August 16-17. George Martin, manager of technical service, Essex Wire Co. spoke on insulation. Frank Spiegel of Brownell Distributors, Atlanta, Ga. demonstrated a dynamometer, and NISA secretary J. Arthur Turner of Tampa (Fla.) Armature Works, led a question and answer session.

Southwestern Chapter members have been considering holding their spring meeting in Monterrey, Mexico. If the group meets there, it will be the first NISA gathering in that country, although the association has been represented by members in Monterrey and Mexico City for many years.

The glittering title "There's Gold in Your Trade Association" was the first of a number of talks at the Tulsa meeting of Southwestern Chapter, held at Hotel Tulsa on September 18-20. T. A. Rose Jr. of Reserve Insurance Co., Dallas, was the speaker.

Others on the two-day program included NISA's president Paul Sievert, beginning his round of speeches which will take him across the country and into Canada before the next national convention in Montreal, May 11-15. Mr. Sievert's topic was "NISA—Present and Future."

Ball bearing engineering and maintenance was reviewed by Walter E. Ziegenbein of Chicago, manufacturers' agent. Epoxy resins were discussed by John D. Mayes of John C. Dolph Co., Monmouth Junction,

to be well grounded—



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a. GF-13B Solderless Ground Fittings—Rugged bronze for strong, permanent grounding. For $\frac{1}{2}$ -1", $1\frac{1}{4}$ - $1\frac{1}{2}$ ", $1\frac{1}{4}$ -2" pipe.

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b. GF-23 Conduit Solderless. Adjustable swivel hub. Strong bronze alloy. For $\frac{1}{2}$ " to 1" dia. pipe.

d. SL Type. UL approved. Tempered pure copper. Wire up to AWG #8 solid. Positive and permanent.

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FASTENERS
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REFRIGERATOR MEN PLUMBERS
NEW "GRIP-TYPE"
SNAPS ON

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Easy-Drive
"NAIL-IT" STRAPS

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Units have lifetime guaranteed See-Thru plastic drawers with moveable dividers. Both Handy-Kit and Cabinets complete with brushes for single phase motors, vacuum cleaners, mixers, fans, portable tools, etc. Units assure you have the right replacement stock on hand.

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N. J. and Stan Rejda, of Epoxylite Corp., El Monte, Calif.

J. W. Blake of the Oklahoma Gas & Electric Co. spoke on "Static and Dynamic Balancing and Vibration Analysis."

Some big questions about large motors were answered by Ray Welborn, Beaumont, Texas; C. G. Smith, of Tulsa; Ed Green, of Amarillo; and James E. Pipher of Oklahoma City. Jim Phares of Southwestern Electric, Oklahoma City, talked about new insulation systems.

Another big meeting of Nisans was held on October 2-4 when shop men from the southeastern states converged on Old Point Comfort, Va. Roy Shinault of Electric Motor & Repair Co., Richmond, Va., handled arrangements.

The opening of the fall season of Central District Chapter of NISA (Chicago) was the occasion for a social get-together and discussion on September 9 at Hotel Graemere.

Chicago Utility Backs All-Electric Home Heating

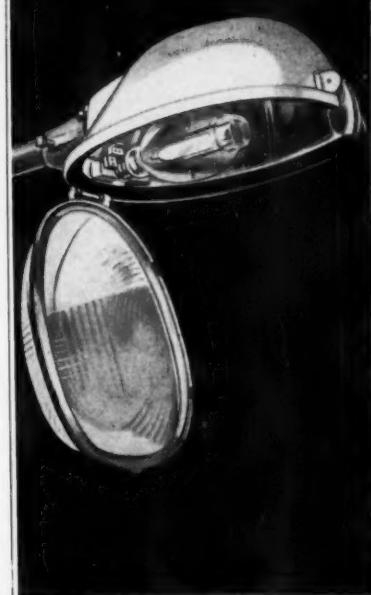
With an announcement of a new low rate for residential customers who install permanent complete electric space heating facilities, Commonwealth Edison Company, Chicago, revealed that it plans an active campaign to promote all-electric heat for homes in Chicago and northern Illinois.



GETTING THE LATEST on proposed NEC changes from Frank Stetka (center), NEC Correlating Committee secretary, are electrical inspectors Joseph Turek (left) Berwyn, Ill., and N. H. Person, Chicago.



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**NEW FORM 400C
MERCURY LUMINAIRE**

ONE-PIECE REFLECTOR HOUSING

- New General Electric one-piece, anodized-aluminum reflector-housing.
- Lighter weight for easy installation and maintenance; larger volume for effective heat dissipation.
- Outstanding versatility; operates five lamps, provides four IES distribution types.
- With precision-molded glass refractor, provides unequalled photometric performance.

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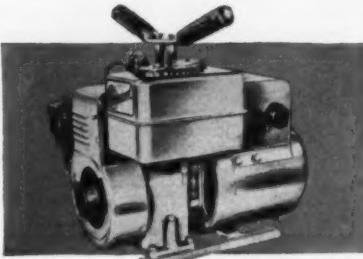
GENERAL **ELECTRIC**

"How do you like the Universal line of electric power and light plants?"

"Fine! We use Universals for on-job power... meet customers' needs, too."

Electrical contractors are cashing in on Universals. They speed their jobs with portable electric power... supply business, public buildings, homes, construction jobs with the complete line of low-priced, need-meeting electric plants.

Universal has many special models for all job-power requirements, as well as a complete range of emergency-standby types. Air- and water-cooled, gasoline and diesel models. All types of controls. From 250 watts to 35 k.w.



Plug-in power for any need anywhere is provided by this portable 1200-watt Universal. One of dozens of models.

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UNIVERSAL MOTOR COMPANY, 438 UNIVERSAL DRIVE, OSHKOSH, WISCONSIN



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PIERCE RENEWABLE FUSES not only give positive protection to valuable equipment — they save costly down-time from "false-alarm" blows. Strong tubular bridge assures perfect clip contact and alignment of knife blade; screened vent holes allow heated air or dangerous gases to escape with positive safety. Operation is 10 to 40% cooler, fuse life, 6 to 8 times longer. Links are replaceable in seconds, using only a screwdriver. Cut time losses, cut worries with Pierce Balanced Lag Renewable Fuses.

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I would like to see and compare one of your Balanced Lag Pierce Fuses:

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PROMPT ANSWER to a pertinent question at Western Section, IAEI huddle in Detroit is given to: (L to R) Fred Volkman, Appleton, Wis., and John E. Wise, Madison, Wis., by W. E. Stewart, St. Louis, chairman of the Western Section NEC Correlating Committee.

For such customers, the new rate accepted by the Illinois Commerce Commission is 1½ cents per kilowatt-hour for all electricity used over 500 kilowatt-hours per month. This is about 30% below the present minimum average residential rate of 2½ cents. Like all other Edison rates, this is subject to a fuel adjustment clause.

Included in the promotional plans are a series of sales training sessions for employees, dealers and contractors as well as an electrical contractor's school to cover application and installation techniques.

A number of residential complete electric heating installations are already in operation in the Chicago area. These include private residences and new apartment flats. Most recent addition to the all-elec-



COMBINED TALENTS of this trio are focused on the construction division of Kirkhof Electric Company in Grand Rapids, Mich. Checking plans for new project are: (L to R) P. Steketee, construction supervisor; J. L. Seaman, vice president; and Henry Quint, construction engineer.

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Carbon Filament Lamps

Heavy duty carbon lamps including infra-red available in many standard and special shapes, colors, sizes.

Candle Flame Lamps

Unique shape, give soft diffused glow.

Nalcorite Lamps

Tungsten filaments for brighter decorative lighting.

Candybelle Lamps

For sharp, brilliant decorative lighting.



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Send for literature and price list.

Prompt delivery.

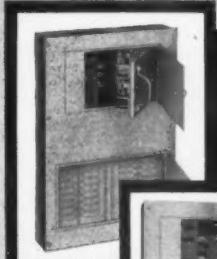
NORTH AMERICAN
Electric Lamp Co.

1594 N. 13th St.

St. Louis 6, Mo.

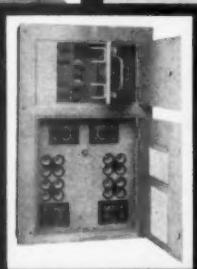
200 AMPERE HOUSEPOWER

FUSIBLE OR CIRCUIT BREAKERS
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ETC.

INDOOR
&
OUTDOOR



* WRITE FOR
NEW CATALOG

The WADSWORTH Electric
MFG. CO., INC.
COVINGTON, KENTUCKY



NAUTICAL-MINDED Clark Mesler of Grand Rapids, Mich., has a definite electrical vocation. He is president of Consolidated Electric Company, a combination construction and motor repair operation; also is active in NISA circles as president of the new West Michigan Chapter of that organization.

tric home roster is a projected 250-home development in St. Charles, Ill. These 1,000 sq ft prefabricated residences in the \$15,000-\$16,000 price range, are being equipped with a 200-amp service from underground distribution and have 10 kw of electric baseboard heating. Edison management expects that approximately 500 houses and apartments in the company's service area next winter will be using electricity exclusively for heating. Many more installations are in the planning stage, it was revealed.

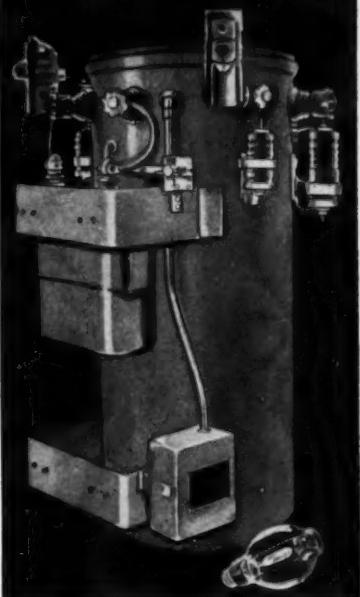
NEW BOOKS

Lighting Handbook, 250 pages, pocket-sized edition, Westinghouse Electric Corp., Lamp Division, Bloomfield, N. J. Price: \$3.00 prepaid. This new edition contains comprehensive coverage of modern lighting, including a revised section on the newest light sources, information on coefficients of utilization and maintenance factors, plus chapters on interior wiring, school and office lighting, industrial and architectural lighting, floodlighting design, and the cost of lighting.

Graphic Science, 758 pages, by Thomas E. French and Charles J. Vierck, McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. Price: \$8.50. This book is aimed at a complete understanding of graphical methods as they relate to the problems of the engineer, not the draftsman. The book offers a presentation of the fundamentals of projection and projection drawing, a coverage of descriptive



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- New 400-watt mercury lamp with built-in cutout—*exclusive G-E development* gives reliable operation.
- *Packaged* substation-type regulator—another G-E *exclusive*, combines all control equipment in self-contained, pre-assembled package.
- Eliminates need for separate ballasts for series circuits.
- Reduces costs of installation, operation, and maintenance. 450-3.5

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Free tool inspection when requested • Genuine B&D parts used • Factory-trained technicians handle all work • Standard B&D Guarantee at completion of recommended repairs • Fast service at reasonable cost.

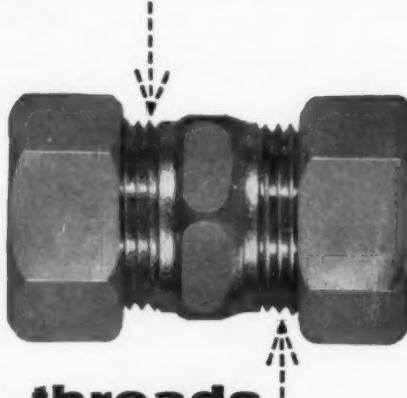
Or write for address of nearest of 48 branches to:
THE BLACK & DECKER MFG. CO., Dept. S3110, Towson 4, Md.



Full

perfect threads

work faster and easier



BLACKHAWK EMT FITTINGS have full, true, perfect threads for ease and speed of installation. Bodies of heavy steel — cadmium and zinc finished to eliminate corrosion on the unit itself. Blackhawk's new EMT fittings are rain tight. Quality controlled at every phase of the manufacturing. In demand for electrical jobs large

and small because they're easy to use.

Blackhawk's new EMT fittings are a product of continuing Blackhawk research and automated methods of manufacture. Order a stock today to meet the demand for these quality made, EMT fittings. A complete range of sizes is now available.



Blackhawk Industries, Dubuque, Iowa

Where the new ideas come from



CHECKING DETAILS of the electrical system for the Angola service area, New York State Thruway, located between Buffalo, N. Y. and Erie, Pa., are firm partners Arthur L. Zigas and Henry J. Wald, of Wald and Zigas, mechanical-electrical consulting engineering firm of Long Island City, N. Y. Working as a team, Zigas supervises the usual plumbing, heating, air conditioning, ventilation, and structural design details, and Wald supervises electrical design and lighting details, on projects handled by their office.

geometry, and a discussion of graphical solutions. Photographs, pictorial drawings, and orthographic drawings are mixed in the presentation of theory and practice.

Building Exits Code, 256 pages, National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass. Price: \$1.50. This 1958 edition is the recognized guide to life safety from fire in buildings of all types and of all classes of occupancy. Notable additions to this issue are provisions on exits from private dwellings.

Proposed Amendments of the 1956 National Electrical Code, 140 p, National Fire Protection Assn., 60 Batterymarch St., Boston 10, Mass. Price: \$1.75. These are the NEC panel reports, coordinated through the Correlating Committee of the NFPA Electrical Code Committee, proposing NEC revisions for the 1959 edition. Significant proposals include the requirement for installation of fuseholders of Type S design for use with fuses of 30 amps or less; revisions to section dealing with receptacle outlets in residences; minimum requirement of two 20-amp branch circuits in residences. The book is intended to provoke study and comment by the electrical industry.

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by selling
NEW

Big Beam

AUTOMATIC EMERGENCY LIGHTS
with Glass Jar Batteries

Heavy-duty, long-lived glass jar batteries come in 30, 40, 80, and 100 amp.-hr. sizes. Built-in trickle charger and fast charger has 12-hour automatic timer.

It's the most COMPLETELY DEPENDABLE emergency light ever built. When regular lights fail... this new Big Beam turns on instantly... provides many hours of illumination.

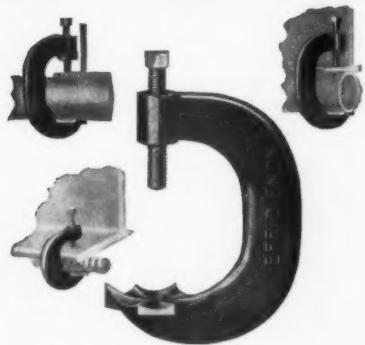
NEW *Big Beam*
**EXPLOSION-PROOF
HAND LAMP**

Approved by Underwriters' Laboratories for use in hazardous locations, Class I, Group D. Designed to meet popular demand for a SAFE lamp with Big Beam's quality features. **6566**

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EFFICIENCY CONDUIT HANGERS. for GAS • CABLE and AIR LINES



On Steel Construction, "Type F" hangers are best for carrying $\frac{1}{2}$ to $2\frac{1}{2}$ pipe and armored cable at any angle to beams.

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ELECTRIC & MFG. CO.
EAST PALESTINE, OHIO



CONTRACTOR in Terre Haute, Ind. who devotes a great deal of his time to promoting residential fixtures, all types of residential work and electric heating, is Jim Kline of the Richmond-Kline Electric Co. Mr. Kline is displaying one of the many attractive fixtures featured in the firm's modern showroom.

Buildings for Research, 232 pages by the editors of **Architectural Record**. F. W. Dodge Corp., 119 W. 40th St., New York 18, N. Y. Price: \$9.50. In this book are surveys of 44 outstanding research facilities with covering commentary and photographs, plus additional longer text sections by men prominent in the field of research building design. The material should be of interest to architects, engineers and designers charged with planning the building and facilities of the great number of research projects which will inevitably be scheduled for the near future. This volume breaks research buildings down into specific areas for detailed study.



IOWA INSPECTORS H. F. Waychus, Mason City; and L. W. Roper (Western Section, IAEI vice president) of Council Bluffs, relax before business session at Western Section, IAEI annual convention in Detroit.



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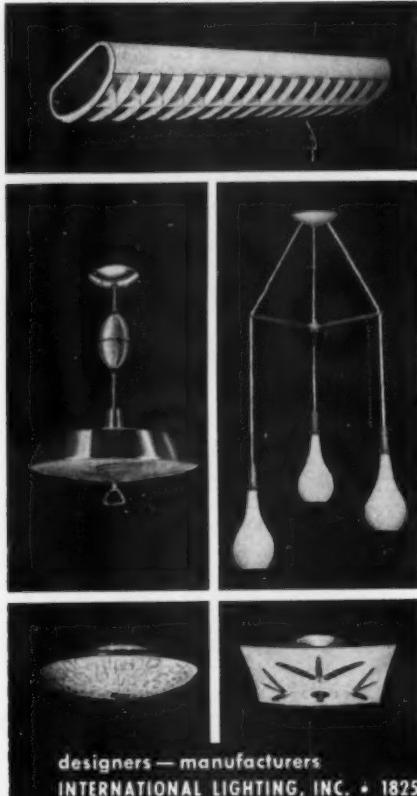
REGULATOR BALLASTS FOR MULTIPLE CIRCUITS

175-, 250-, 400-WATT RATINGS

- Provides constant current to assure optimum lamp life.
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- Equipped with easy-to-identify, permanently marked leads.
- Universal mounting—pole-base, aerial, or pole-top. Satchel handle excellent for carrying.

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DATES AHEAD

International Association of Electrical Inspectors—Eastern Section, Laurels Hotel, Monticello, N. Y., October 13-15; Southern Section, Miami, Fla., October 20-22.

National Electronics Conference, Inc.—Hotel Sherman, Chicago, Ill., October 13-15.

National Society of Professional Engineers—Fall meeting, St. Francis Hotel, San Francisco, Calif., October 23-25.

American Institute of Electrical Engineers—Fall General meeting, Penn-Sheraton Hotel, Pittsburgh, Pa., October 27-31.

National Electrical Manufacturers Assn.—Annual conference, Hotel Traymore, Atlantic City, N. J., November 10-14.

National Electrical Contractors Assn.—Annual convention and National Electrical Exposition, Adolphus Hotel, Dallas, Texas, November 16-21.

American Society of Mechanical Engineers—Annual meeting, Hotel Statler and Sheraton McAlpin Hotel, New York, N. Y., November 30-December 5.

14th International Heating & Air Conditioning Exposition—Commercial Museum & Convention Hall, Philadelphia, Pa., January 26-29, 1959.

National Electrical Week—An all-industry event, February 8-14.

Electrical Associates, Inc.—National Electrical Week luncheon, Sheraton-Astor Hotel, New York, N. Y., February 10.

2nd Biennial Electrical Trade Conference & Exposition—Sponsored by Electrical Trade Institute of Washington, Sheraton Park Hotel, Washington, D. C., February 17-18.

2nd National Lighting Exposition—Coliseum, New York, N. Y., March 1-4.

Industrial Electrical Exposition—Sponsored by Essex Electrical League, Olympic Park, Newark N. J., Week of March 2d.

Edison Electric Institute—Annual Convention, New Orleans, La., April 5-9.

National Industrial Service Assn.—Queen Elizabeth Hotel, Montreal, Canada, May 17-21.



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Among the Manufacturers

Headquarters Announcements

Howard Industries, Inc., Racine, Wis., has purchased the Induction Motors line from Westinghouse Electric Corp. of Lima, Ohio.

Supreme Lighting Co., Los Angeles, Calif., has acquired the Lumi-Dyne Corp. of Culver City, Calif.

Daniel Woodhead Co., Chicago, Ill.—Walter Hoyer, controller.

Royal Electric Corp., Pawtucket, R. I.—Leonard Broder, vice president, manufacturing.

Vickers Inc., St. Louis, Mo.—Lester W. Buechler, general sales manager, Electric Products Div.

Plymouth Rubber Co., Inc., Canton, Mass.—Frank E. Harris, Jr., assistant sales manager, Tape Div.

Mears Electric Circuit Breakers, Inc., Swan Island, Portland, Ore.—Henry G. Lehl, sales and marketing vice president.

Harvey Hubbell, Inc., Bridgeport, Conn.—William H. Gatenby, assistant to the general manager.

Silvray Lighting, Inc., Bound Brook, N. J.—Henry Engel, division manager, new special process and miniature lamp division.

Chester Cable Corp., Chester, N. Y.—Howard A. Utech, sales manager, Electrical Div.

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—George G. Brooks, manager of product sales, control department.

Chase-Shawmut Co., Newburyport, Mass.—P. Gordon Johnston, president, succeeding Dr. William S. Edsall, retired.

Federal Pacific Electric Co., Newark, N. J.—John T. Romano, vice president; Glen A. Dusch, manager, new Divisional Sales Section.

Westinghouse Electric Corp., Bloomfield, N. J.—Philip F. Dietz, assistant to the manager, photo-miniature lamp department.

Gulton Industries, Inc., Metuchen, N. J.—Arthur L. Kenn, consumer products marketing manager, Alkaline Battery Div.

General Electric Co., Cleveland, Ohio—Robert F. Johnson, general manager, new Lamp Metals and Components Dept., Lamp Div.

Edwin L. Wiegand Co., Pittsburgh, Pa.—Pressly H. McCance, assistant to the president.

Wheeler Reflector Co., Boston, Mass.—Winthrop W. Sargent, general manager.

Gust A. Berthel, formerly with



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Jefferson Electric Co., Bellwood, Ill., and Controls Co. of America, has opened office as engineering consultant in Park Ridge, Ill.

Quadrangle Mfg. Co., Chicago, Ill.—Joseph A. Schneller, manager, sales and marketing.

Regional Appointments

NEW ENGLAND

Chester Cable Corp.: Robert W. Gray Inc., representative for all New England states, office in Wellesley, Mass.

MIDDLE ATLANTIC

Sunbeam Lighting Co.: Sudan Associates, Inc., Buffalo, N. Y., sales representatives in western New York State; Dave Samberg Electrical Sales Co., agents in Metropolitan New York City area.

Sequoia Wire & Cable Co.: W. Edward Macbeth, in charge of new regional office in New York City.

Sylvania Lighting Products: Raymond W. Corwin, sales manager for fluorescent fixtures in metropolitan New York, New Jersey, Eastern Pennsylvania and Delaware.

Gould-National Batteries, Inc.: Joseph D. Whittemore, Jr., district manager of sales for the Eastern United States, office in New York.

Triangle Conduit & Cable Co.: Joseph T. Devlin, Philadelphia sales representative for Electrical Div. in western Pennsylvania; Thomas F. Quinn, Philadelphia district manager, Electrical Div., in Eastern Pennsylvania, Southern New Jersey, and Northern Delaware.

SOUTH ATLANTIC

Pittsburgh Standard Conduit Co.: B. Allen Bryant, Atlanta, Ga., representative for Georgia and eastern Tennessee; W. J. Broughton Co., Birmingham, Ala., representative for Alabama and Florida's western panhandle; W. I. Crichton and Associates, Tampa, Fla., representative for remainder of Florida.

Day Brite Lighting, Inc.: Gordon Wells, Southern Regional sales manager.

Allis-Chalmers Mfg. Co.: E. T. Cuddeback, manager, general products division sales, Southeast region, office in Atlanta, Ga.

EAST CENTRAL

Chester Cable Corp.: Ringland M. Krueger Co., Chicago, representative for Illinois and Wisconsin.

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Electric Auto-Lite Co.: Joseph T. Osterman, Chicago district representative, Electrical Products Group.

Westinghouse Electric Corp.: John O. Campbell, Chicago area sales manager, apparatus division.

Rome Cable Corp.: Jack F. Guyer, sales manager, Ohio district office in Cleveland.

Century Electric Co.: W. D. Helm, manager, Chicago office.

WEST CENTRAL

Pittsburgh Standard Conduit Co.: Bixler-O'Dougherty Co., Des Moines, Iowa, representative in state of Iowa.

International Resistance Co.: Halgin Sales Co., representative for Kansas, Missouri and Southern Illinois.

Century Electric Co.: Grant Hodgeskiss, manager, Omaha, Neb., office; F. L. Beattie, acting district manager, Milwaukee branch office.

WEST

Spang-Chalfant Div., National Supply Co.: Galvin Sales Co., Dallas, sales representative for Texas.

Hitemp Wires, Inc.: Robert Bouvette, technical service engineer for Rocky Mountain area, office in Denver, Colo.

Okonite Co.: James B. Caldwell, Jr., manager of San Francisco office.

Automatic Switch Co.: Control Equipment Co., Salt Lake City, Utah, representatives in Utah and parts of Nevada, Idaho, Montana and Wyoming.

Universal Wire & Cable Co.: Collyer Electric Wire Sales Co., exclusive agents in Los Angeles area.



THIRD PRIZE in the Industrial Lighting classification of the Architect-Engineer division of the 1957 International Lighting Competition was won by William S. Watkins (center), consulting engineer, for his job in the Reighart Steel Products Corp. plant at Willoughby, Ohio. Award certificate was presented by Frank J. Seiler (left), Cleveland District Manager for Electrical Construction and Maintenance, while J. H. Reighart, President of Reighart Steel Products Corp. looks on.

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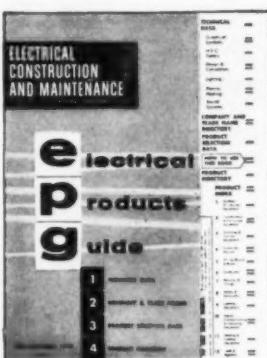
IMPULSE GENERATOR

WANTED: Used impulse generator 550 KV minimum. Please reply with descriptive material and photos.

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For more complete information, and application data on their lines, refer to the index of Advertisers in the ELECTRICAL PRODUCTS GUIDE . . . the 13th issue of ELECTRICAL CONSTRUCTION AND MAINTENANCE.

• These manufacturers advertised their products in the ELECTRICAL PRODUCTS GUIDE

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F. J. Eberle, Business Mgr.

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EQUIPMENT

(Used or Surplus New)

Wanted . . . 229

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YOU PAY FOR OVERLOAD PROTECTION

Only ONE-PIECE Overload Relays give 100% Protection. Only with ONE-PIECE construction can you *know* you've installed the heater correctly. Only with ONE-PIECE construction can you *know* the heater is exactly centered, or properly positioned, so that it performs according to its rating. Only with ONE-PIECE construction can you *know* your motors have full protection.

Only Square D has ONE-PIECE Construction. ONE-PIECE construction eliminates any possibility of heater misalignment. Square D melting alloy thermal overload relays can be installed only one way. They are tamper-proof. They are factory-assembled, are *individually* calibrated and tested. Repeated tripping will not affect accuracy.

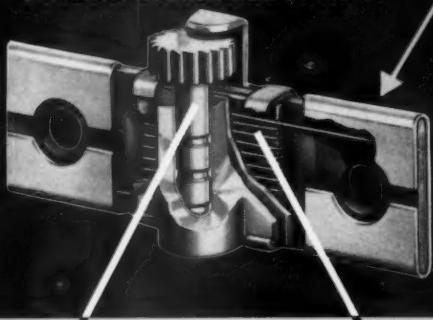
Insist on

Square D melting alloy thermal overload relays

Write for Bulletin SM-275 for the complete story on Square D starters with ONE-PIECE thermal overload relays. Address Square D Company, 4041 N. Richards St., Milwaukee 18, Wisconsin.

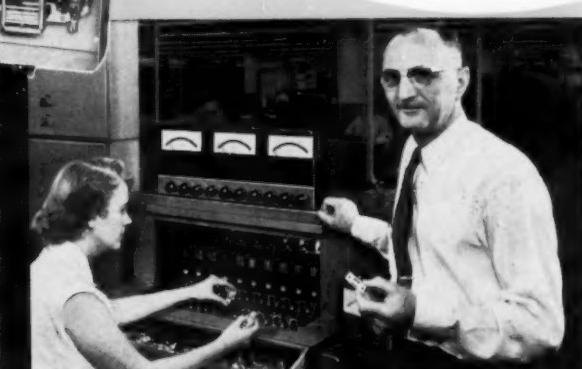
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1-PIECE CONSTRUCTION

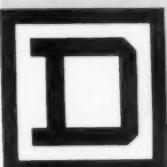


Heat-responsive element (solderpot) provides accurate response to overload, yet prevents nuisance tripping.

Heat-producing element is an integral part of overload unit. It's permanently joined to solder pot, can't become misaligned.



Individual factory inspection of every Square D melting alloy thermal overload relay means performance you can trust. Each unit is calibrated and thoroughly tested to make sure it will perform according to its rating.



EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY



For qualities beyond your specifications —

CONDULETS... made only by Crouse-Hinds

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And no wonder. Only Condulet rigid conduit fittings have all these features:

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- ✓ Longer hubs for a better wrench grip.
- ✓ Taper tapping to match ASA standard tapered conduit threading for a rigid joint that will not loosen.
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SEE OUR SPECIAL MULTI-PAGE SECTION ON CROUSE-HINDS LIGHTING EQUIPMENT ELSEWHERE IN THIS ISSUE.

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- ✓ Feraloy, a special alloy that is strong, resists corrosion, and gives full, sharp threads.

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• TRAFFIC CONTROL SYSTEMS • AIRPORT LIGHTING and WEATHER MEASURING EQUIPMENT

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